August 11-13

University of Malaya

Kuala Lumpur, Malaysia

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2018 9th International Conference on Manufacturing Science and Technology (ICMST 2018)

with workshop

2018 International Conference on Control and Robot Technology (ICCRT 2018)

Supported By

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Instructions

Registration Guide:

Arrive at the Conference Venue→Inform the conference staff of your paper ID→Sign your name on the Participants List→Check your conference materials.

Checklist:

1 receipt, 1 name card, 1 printed conference abstract, 1 lunch coupon, 1 dinner coupon, 1 computer bag, 1 USB stick (paper collection).

Devices Provided by the Conference Organizer:

Laptops (with MS-Office & Adobe Reader)

Projectors & Screen

Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: 15 Minutes of Presentation including 2-3 Minutes of Q&A

Notice:

*Certificate of Listener can be collected in the registration counter.

*Certificate of Presentation can be collected from the session chair after each session.

*The organizer will not provide accommodation, so we suggest you make an early reservation.

*One best presentation will be selected from each session. The best one will be announced when each session ends, and will be awarded by the session chair after each session in the meeting room.

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Message from the Conference Chair

Dear Participants,

Welcome to the 9th International Conference on Manufacturing Science and Technology, ICMST 2018 which will be held in Kuala Lumpur, Malaysia from 11-13th August 2018. The conference's theme is "Innovative Green Manufacturing & Technology for Sustainable Development". A workshop with the title "International Conference on Control and Robot Technology (ICCRT 2018)" will also take place in conjunction with the ICMST 2018.

ICMST 2018 and ICCRT 2018 provide a platform to disseminate to all branches of manufacturing, automotive, and robotic industries, information on the most recent and relevant sustainable innovations, theories and practices in manufacturing and automotive sciences and technologies. ICMST2018 and ICCRT2018 are aimed at providing an excellent avenue for academicians, students, researchers, professionals, engineers, and scientists from academia and industry to share their research findings and building network for further collaborative research in their respective areas. Parallel sessions on several fields of manufacturing and technology and workshop on automation and robotics will be hosted over a period of three days.

I wish to take this opportunity to express my heartfelt appreciation to Conference International advisory Committee Prof. Fan-Tien Cheng, National Cheng Kung University, Taiwan, Conference Program Chairs Prof. Suksan Prombanpong, King Mongkut's University of Technology Thonburi (KMUTT), Thailand, Prof. Vincent Lee Chieng Chen, Curtin University, Sarawak, Malaysia, Prof. Erween Abd Rahim, Universiti Tun Hussein Onn Malaysia, Malaysia, Prof. Petr Valasek, Czech University of Life Science Prague, Czech Republic, Prof. Mohammad Yeakub Ali, International Islamic University Malaysia, Malaysia, and Prof. Dr. Eric Dimla, Universiti Teknologi Brunei, Brunei.

I would like to express my gratitude and appreciation to the Conference Technical Committee for their great contribution in organizing this conference. I would also like to thank Curtin University, Malaysia, University of Malaya, Malaysia, Chengdu Zonghang Exhibition and Services Co. Ltd, who had kindly given us support. Special Thanks to TTP Trans tech Publications Inc. for providing the platform to publish the conference papers. Many thanks to the reviewers for their excellent job to maintain the academic quality and scholarship.

Finally, I would like to thank the conference keynote speakers and participants, for coming to Kuala Lumpur to share their knowledge with the rest of the participants. I hope these conferences will prove to be intellectually stimulating to all participants.

Hope you will enjoy the conferences, the food, the hospitality, and the beautiful and charming environment of Kuala Lumpur City!

Conference Chair

Prof. Sujan Debnath, the Head of Mechanical Engineering, Curtin University, Sarawak, Malaysia

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Prof. Sujan Debnath, Curtin University, Sarawak, Malaysia

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Prof. Mu-Song Chen,Electrical Engineering, Da-Yeh University, Taiwan

Prof. En-Chih Chang, I-Shou University, Taiwan

Prof. Dr. Muhammad M. A. S. Mahmoud, Baku Higher Oil School, Azerbaijan

Agenda Overview

Saturday, August 11, 2018

10:00-17:00 **Participants check-in & Materials Collection—Lecture Hall-2F**

Sunday, August 12, 2018

Venue: Lecture Hall-2F

09:00-09:05 **Opening Remark**
Prof. Dr. Mohd Hamdi Bin Abd Shukor, University of Malaya, Malaysia

Speaker I
09:05-09:45 **IEEE Fellow，Prof. Fan-Tien Cheng, National Cheng Kung University, Taiwan**
Speech Title: Advanced Manufacturing Cloud of Things
(Industry 4.0 + AVM = Industry 4.1)

Speaker II
09:45-10:25 **Prof. Sujan Debnath, Curtin University, Malaysia**
Speech Title: Closed Form Solutions of Interfacial Shearing and Peeling Stresses at Layered Structures in Electronic Packaging

10:25-10:50 ***Coffee Break and Group Photo-4F***

Speaker III
10:50-11:30 **Prof. Dr. Mohd Hamdi Bin Abd Shukor, University of Malaya, Malaysia**
Speech Title: Spark Plasma Sintering: An Emerging Technique for Bioceramics Fabrication

Speaker IV
11:30-12:00 **Prof. Dr. Eric Dimla, RMIT University, Vietnam**
Speech Title: Artificial Neural Networks: A Manufacturing Engineering Perspective and Case Study Review

12:00-13:30 ***Lunch at Cafetera-4F***

Plenary & Invited Speeches + Parallel Sessions

13:30—16:00
Lecture Hall (2F)

Speaker V (13:30-14:00)
Prof. Petr Valasek, Czech University of Life Science Prague, Czech Republic
Speech Title: Polymeric-biocomposite Systems with Plant Fibres from Asia Region

Speaker VI (14:00-14:30)
Prof. Erween Abd Rahim, Universiti Tun Hussein Onn Malaysia, Malaysia
Speech Title: Application of Vegetable-based Lubricant as a Sustainable Metalworking Fluid for Machining Process

Session 1: Mechanical Manufacturing and Control Engineering (14:30-16:00)
RT3003 MS037 RT1002 MS043 MS033 MS009

13:30—15:50
Conference Room (2F)

Speaker VII (13:30-14:00)
Prof. Mohammad Yeakub Ali, International Islamic University Malaysia, Malaysia
Speech Title: Dry Eelectrical Discharge Machining: An Environmental Friendly Machining Process

Speaker VIII (14:00-14:20)
Dr. Kapil Gupta, University of Johannesburg, South Africa
Speech Title: Modern Manufacturing of Miniature Gears

Session 2: Composite Materials and Structures (14:20-15:50)
MS003 MS008-A MS011 MS014 MS018 MS035

16:00—16:20 ***Coffee Break-Cafetera (4F)***

16:20—17:50 **Session 3: Metallic Materials and Chemical Engineering (Lecture Hall-2F)**
MS006 MS004 MS027 MS013 MS025 MS002

09:00—18:00 **Poster Session (Lecture Hall-2F)**

18:00—20:00 ***Dinner at Cafetera-4F***

Monday, August 13, 2018

One Day Tour in Kuala Lumpur

Introduction of Speakers

Speaker I

IEEE Fellow，Prof. Fan-Tien Cheng, National Cheng Kung University, Taiwan

Speech Title: Advanced Manufacturing Cloud of Things (Industry 4.0 + AVM = Industry 4.1

Abstract: Virtual Metrology (VM) is a method to conjecture manufacturing quality of a process tool based on data sensed from the process tool and without physical metrology operations. In other words, VM can convert sampling inspection with metrology delay into real-time and on-line total inspection. This talk will first introduce the theories and functions of the Automatic Virtual Metrology (AVM) system and then demonstrate how to apply AVM to high-tech (semiconductor, TFT-LCD, etc.) and traditional machine-tool (automobile wheel machining, airplane engine casing, etc.) industries. The current Industry 4.0 platform can only keep the faith of achieving the nearly Zero-Defects state without realizing this goal. In other words, Industry 4.0 only emphasizes "Enhancing Productivity" but not "Improving Quality". The key reason for this inability is the lack of an affordable online and real-time total inspection system. The Zero-Defects state can be achieved by adopting the AVM system due to its capability of providing all products total inspection data. As the AVM system is integrated with the Industry 4.0 platform, the goal of Zero-Defects can be accomplished, which is defined as "Industry 4.1." This talk then focuses on how to utilize Internet of Things (IoT), Big Data Analysis, Cloud Manufacturing (CM), and Cyber Physical Systems (CPS) along with the AVM technology to develop an Advanced Manufacturing Cloud of Things (AMCoT) that construct a smart manufacturing platform for achieving the goals of Industry 4.1.

Biography: Soon after Fan-Tien Cheng graduated from the department of Electrical Engineering of National Cheng Kung University (NCKU) in 1976, he got in the Chung Shan Institute of Science and Technology (CSIST), serving as Research Assistant at the most basic level and then got promoted to Senior Scientist in 19 years. Then he went back to NCKU to start his teaching career and devoted the knowledge and practices he had learned in CSIST to the research domains of manufacturing automation and e-Manufacturing for industries such as semiconductor, TFT-LCD, solar cell, machine tool, and aerospace to help achieve the goals of enhancing the industry competitiveness by successfully improving manufacturing processes and lowering production cost.
Professor Cheng's research achievements are significant both academically and industrially in the domains of e-Manufacturing, Smart Manufacturing, and Industry 4.1. Among those, he has been taking the lead especially on the academic and practical applications of VM technologies. So far, he has more than 25 VM-related journal papers, dozens of VM invention patents both domestically and internationally, and 35 AVM-related technology transfers to high-tech industries like semiconductor (TSMC, UMC, ASE), TFT-LCD (CMI, AUO), solar cell (Motech) and traditional industries such as aerospace (AIDC) and machine tool (FEMCO) as well as foundations/associations like ITRI and MIRDC. In one word, he has exceptional contributions in both the academy and industries.

Some of Professor Cheng's honors and awards include: 2011 Award for Outstanding Contributions in Science and Technology from the Executive Yuan, three times of National Science Council (NSC) Outstanding Research

Award (2006, 2009, 2013), 2006 NSC Outstanding Industry-University Cooperation Award, 2012 National Invention and Creation Award—Gold Medal (System and Method for Automatic Virtual Metrology) of Ministry of Economic Affairs (MoEA), University-Industry Economic Contribution Award from MoEA, Industry-University Cooperation Award for College Teachers of Ministry of Education, NCKU Chair Professor since January 2009, 17th TECO Award from TECO Technology Foundation in 2010, 2014 Outstanding Research Award of Pan Wen Yuan Foundation, 2014 K.-T. Li Science and Humanities Chair, 2015 20th Outstanding Achievement Award of The Phi Tau Phi Scholastic Honor Society, 2016 Machinery Industry-University Contribution Award of Taiwan Association of Machinery Industry (TAMI), and 2016 Ministry of Science and Technology (MoST) Outstanding Technology Transfer Award (for enhancement and extending applications of AVM), as well as IEEE Fellow since January 2008, 2013 IEEE Inaba Technical Award for Innovation Leading to Production (for contributions to the development of the AVM System), two times of IEEE ICRA Best Automation Paper Award in 1999 and 2013, and IEEE CASE Best Application Paper Award in 2017. He was also the Program Chair of IEEE CASE 2014, the Award Chairs of both CASE 2016 and ICRA 2017, and the Lead Guest Editor of IEEE Transactions on Automation Science and Engineering (2014~2015).

Speaker II

Prof. Sujan Debnath, the Head of Mechanical Engineering, Curtin University, Malaysia

Speech Title: Closed Form Solutions of Interfacial Shearing and Peeling Stresses at Layered Structures in Electronic Packaging

Abstract: The study of thermal mismatch induced interfacial stresses at layered structures and their role in structural and functional failure is one pertinent topic to electronic packaging and photonic applications. Therefore, an understanding of the nature of the interfacial stresses under different temperature conditions is necessary in order to minimize or eliminate the risk of mechanical failure. An accurate assessment of interfacial thermal stresses plays an important role in the design and reliability studies of microelectronic devices. In the microelectronic industry, from a practical point of view, there is a need for simple and powerful analytical models to determine interfacial stresses in layered structures quickly and accurately.

The present lecture will briefly review the previous work on the determination of interfacial thermal stresses. In the present work, the case of uniform temperature model of two layered structure has been extended to account for differential uniform temperatures as well as linear temperature gradient in the layers. The expression of shear stress compliance is defined to avoid contradictions by the earlier researchers. The influence of bond material and geometric properties on interfacial stresses is also considered in a simple way.

Finally, a simple and improved solution for tri layered structure subjected to uniform and differential uniform temperature in the layers is proposed by removing the short comings of the earlier model. The condition for bow free assembly is also discussed.

Biography: Dr. Sujan (CEng MIMechE) Joined Curtin University, Sarawak Malaysia in October 2008 after completion of two years tenure in Multimedia University, Malaysia. Since 2014, he has been appointed as the Head of Mechanical Engineering, Curtin Sarawak. Dr. Sujan obtained his PhD Degree from the University of Science Malaysia in 2006 majoring applied mechanics with specific research focuses on interfacial thermal mismatch stress analysis in layered structure.

Over the years, he has been working in the area of thermo-mechanical stress analysis, green composite materials, and polymer composite materials. He has more than 65 publications in reputable international journals and conference proceedings.

At present, Dr. Sujan is supervising four PhD and three MPhil students. Dr. Sujan is a Chartered Engineer and member of the Institute of Mechanical Engineers, UK.

Speaker III

Prof. Dr. Mohd Hamdi Bin Abd Shukor, University of Malaya, Malaysia

Speech Title: Spark Plasma Sintering: An Emerging Technique for Bioceramics Fabrication

Abstract: Spark plasma sintering (SPS) is a non-conventional sintering technique which can consolidate samples at lower pressures and temperatures in a shorter time period, compared to the conventional powder processing routes. These less severe processing parameters provide an opportunity to control the mechanical stability, crystallization tendency and grain size of the bioceramics and their composites. In a current research project extremely low pressure SPS has been employed to develop mechanically stable composite scaffold materials with considerable porosity in Hydroxyapatite and Bioglass® system, with the aim to avoid excessive reactions between the constituents and crystallization of Bioglass®. The ability to avoid excessive reactions between the constituents and crystallization is very critical as crystallized Bioglass® does not exhibit the characteristic high biocompatibility and the reaction between the constituents yield undesired new products. The optimized processing parameters during SPS could achieve the mentioned targets which is a novel development. Physico-mechanical characterization, in vitro bioactivity analyses and in vitro biocompatibility analyses have been carried out to analyze the impact of the processing conditions on the final characteristics of the scaffold materials. This novel development has yielded promising bioactivity and biocompatibility results suggesting that SPS has a great potential to improve the biological performance of bioceramics.

Biography: Professor Dr. Mohd Hamdi bin Abd Shukor received his B.Eng. (Mechanical), with Honours from Imperial College, London and his M.Sc. In Advanced Manufacturing Technology & System Management from University of Manchester Institute of Science & Technology (UMIST). His Doctoral study was in the field of thin film coating for biomedical applications for which he was conferred Dr. Eng by Kyoto University. He is a Fellow of the Institution of Mechanical Engineering, UK. Prof Hamdi has devoted his career in nurturing research and innovation and has mentored over 130 postgraduate students, particularly in the field of machining, materials processing and biomaterials. He has authored more than 150 ISI journals and h-index of 20. He is also a director and founder of the Centre of Advanced Manufacturing & Materials Processing (AMMP Centre), in which has grown from modest-size team of researchers and engineers to an interdisciplinary research hub. Prof Hamdi has obtained recognition from various international and local organizations.

Speaker IV

Prof. Dr. Eric Dimla, RMIT University, Vietnam

Speech Title: Artificial Neural Networks: A Manufacturing Engineering Perspective and Case Study Review

Abstract: This paper presents a brief review of Artificial Neural Network (ANN) application in a typical manufacturing engineering scenario. The discussion in the first part centres on the underlying principles and learning algorithms with emphasis on the basic structure of ANNs. It would be extremely laborious and tedious to list all types of neural networks herein but for the purpose of this study, an overview of those networks with proven manufacturing engineering applications was deemed necessary. The merits of ANNs and their applicability was demonstrated by reviewing work performed within the last decade in the chosen area of manufacturing engineering application, specifically Tool Condition Monitoring (TCM) in metal cutting operations.

Biography: Prof. Dr Eric Dimla, is Head of School of Science and Technology, RMIT University Vietnam, since 1st of April 2018. Prior to joining RMIT he was Dean Fculty of Engineering Universiti Teknologi Brunei. Prof. Dimla received the MEng (Hons) degree in Mechanical Engineering in 1994 from University College London (University of London) and did a PhD immediately after that on 'Tool condition monitoring using neural networks in metal turning operations' awarded in June 1998. A postdoctoral research fellowship followed in Aberdeen Scotland where he managed and co-ordinated an EU funded project on renewable energy before his appointment as a lecturer. His research interest is within the area of metal cutting tool-wear and condition monitoring/fault diagnosis, intelligent sensor fusion and signal processing for industrial applications. He has published well over 40 papers at International Conferences/Symposiums and International Journals mainly in high speed machining of metals and the application of AI techniques in metal cutting tool wear monitoring. Prof. Dimla is a chartered mechanical engineer and member of IET and FIMechE.

Speaker V

Prof. Petr Valasek, Czech University of Life Science Prague, Czech Republic

Speech Title: Polymeric-biocomposite Systems with Plant Fibres from Asia Region

Abstract: Composite systems are very progresive materials which have very good mechanical properties and in many cases can be environmental friendly and may save primary resources - fossil raw materials. Cellulose fibres could be gained from renewable resources. Typical plant which may be used as resources of cellulose fibres in Asia region can be Musa trees, Cocos nucifera and very interesting are empty fruit branch as a secondary raw material which are obtained by pressings palm oil (Elaeis guineensis). At a present many countries from Asia region emphasize a social-economic expectation in relation to searching for new materials which will have similar mechanical properties as conventionally used systems. The utilization of renewable natural resources cellulose fibres in an area of composite systems is a topical material trend. The aim of performed lecture is to describe mechanical properties of plant fibres and to define composite systems made by the vacuum infusion, describe mutal phase interaction by electron microscopy and to evaluate the effect of the surface treatments on the resulting properties.

Biography: Petr Valášek is associate professor in the field Technology and mechanization of agriculture on Faculty of Engineering – Czech University of Life Sciences Prague (CULS), Czech Republic. Currently he works at the Department of Material Science and Manufacturing Technology and he is Vice-Rector for Quality of Academic Activities on CULS. He defended his dissertation thesis "Polymer particle composite systems" in the doctoral study program Special technology in the field of study quality and reliability of machines and equipment. He attended of more than hundred lectures at European universities in Italy, Estonia, Latvia, Poland, Spain, Portugal etc. He has passed several Keynote lectures at international non-European universities as well. As part of research projects, he actively participates in various international conferences, and cooperates with foreign universities (e.g. China, Malaysia, and Indonesia). Assoc. Prof. Ing. Petr Valášek, Ph.D. is the author or co-author of 94 entries in the database Scopus, h-index 15 and 44 entries in the database Web of Science. Professional interests: Composite systems, Biocomposites, Biomass usage in materials engineering, Composites with Natural Fibres, Manufacturing Technology.

Speaker VI

Prof. Erween Abd Rahim, Universiti Tun Hussein Onn Malaysia, Malaysia

Speech Title: Application of Vegetable-based Lubricant as a Sustainable Metalworking Fluid for Machining Process

Abstract: Continuous implementation of lubricants from renewable sources such as animal fats, vegetable oils and biolubricants as metalworking fluids in machining applications was contributed by the increase awareness from human health deficiency and bad environmental impacts as well as on sustainable development for future manufacturing activities. Renewable lubricants from vegetable oils are very attractive as alternative lubricant source which pose relevant properties such as highly biodegradable, non-toxic, have good lubricating properties, are made from renewable sources and bear low production costs. Vegetable-based metalworking fluids from palm oil and jatropha oil are desirable as the alternative to mineral oil that possessed negative effect to human and environment. The assessment of its performance was conducted tribological and machinability aspects. Both palm and jatropha oils were chemically modified through various processes and added with an additive, such as ionic liquid and hexagonal boron nitride. The tribological properties of the palm and jatropha oils were further improved in terms of its friction and wear performances by adding the additives. The machining performances of these newly invented vegetable-based MWFs were evaluated in terms of cutting forces, cutting temperature, surface roughness and tool life during turning of AISI 1045 medium carbon steel using uncoated cermet inserts under MQL technique. The thin lubrication film formed by the vegetable-based oils was able to withstand the friction at the tool-workpiece interface, resulted in low cutting force, low cutting temperature, lower surface roughness value and prolonged tool life. This phenomenon was attributed to the formation of long and branched carbon chains in palm and jatropha oils molecule which increased the absorption film ability. From the results of the tribological and machining performances evaluations, the newly developed vegetable-based MWFs were significantly surpassed currently used synthetic ester thus provides new opportunities for minimum quantity lubrication-based oil.

Biography: Dr. Erween Abd. Rahim is a Associate Professor in the Faculty of Mechanical and Manufacturing Engineering at Universiti Tun Hussein Onn Malaysia, where he teaches graduate and undergraduate courses in manufacturing engineering. Dr. Erween holds undergraduate and graduate degrees from Universiti Teknologi Malaysia and Tokyo University of Agriculture and Technology, Japan, with specialization in machining process. Prior to joining academe, Dr. Erween spent 5 years with several manufacturing and business enterprises.

Dr. Erween has numerous publications in the areas of machining processes. He held the position of Head of Precision Machining Research Center since 2016. He is also the author of the Laser Dan Aplikasi Terkini (Laser and Recent application) and Minyak Pelincir Berasaskan Tumbuhan (Vegetable-based Lubricant) books, both written in Malaysian language.

Speaker VII

Prof. Mohammad Yeakub Ali, International Islamic University Malaysia, Malaysia

Speech Title: Dry Eelectrical Discharge Machining: An Environmental Friendly Machining Process

Abstract: The recent ongoing research in dry electrical discharge machining (EDM) is found to be amazing. The established EDM process is capable in fabricating various intricate shapes since it has the ability in removing the material using the thermal energy created by the electrical spark which is carried out in dielectric fluid. Dielectric fluid is significant during the machining operation since it improves the efficiency of the machining process, improves quality of the machined parts, and flushes away the debris from the machining gap. However, the commonly used dielectric fluids are mineral oil-based liquid or hydrocarbon oils have the tendency to cause fire hazard, environmental problems, and health hazard to the machining operators. Therefore, as a solution, dry EDM is introduce as a green machining method where gas with high pressure is used as the dielectric fluid instead of liquid where it act as a coolant and also flushes away the debris from the machining gap. The commonly used gases are atmospheric air, compressed air, liquid nitrogen, oxygen, argon, and helium gas. Lower tool wear, better surface quality, lower residual stresses, thinner white layer, and higher precision in machining are the prime outcome of this dry technique. High accuracy in finish-cut is producible when dry EDM is used since the gap distance between the electrodes are narrower and the reaction force from the gas bubbles during the erosion mechanism is negligible compared to the conventional EDM.

Biography: Professor Dr. Mohammad Yeakub Ali is attached with the Department of Manufacturing and Materials Engineering at International Islamic University Malaysia since 2004. He becomes full Professor in 2011 and was the Head of the department from 2012 until 2016. He graduated with PhD. from Nanyang Technological University in 2002. He obtained his MEng from Asian Institute of Technology in 1997 and BSc Eng from Bangladesh University of Engineering and Technology in 1992.

Prof. Ali's teaching and research interest is in the areas of manufacturing, micromachining, MEMS, metal cutting, engineering management, project management, analytical decision making, and quantitative techniques. He brought a significant amount of research grant from ministry and he has supervised many postgraduate students at Masters and PhD levels. He has published more than 200 articles in reputed journals and conference proceedings. His h index 15. He delivered keynote and invited speech in many international conferences around the world.

In addition to teaching and research, Prof. Ali is an expert in outcome based education and accreditation of engineering programme. In 2016 his programme Bachelor of Engineering (Manufacturing) (Honours) received the longest term five years accreditation under Washington Accord. Prof. Ali is a Chartered Professional Mechanical Engineer from IMechE, and Engineers Australia. He also member of many international professional societies and associations.

Parallel Oral Presentation Sessions

Sunday, August 12, 2018

✧ Tips:

Please arrive at conference room 15 minutes earlier, in case some authors are not able to make the presentation on time.

There will be a session group photo part at the end of each session.

The best presentation will be chosen after each session and the certificate will be awarded by the chair. Good Luck!

Session 1: Mechanical Manufacturing and Control Engineering Chair: **Time: 14:30—16:00** **Venue: Lecture Hall-2F**	
RT3003 14:30-14:45	Effect of Roller Burnishing on Aluminum Surface Roughness and Hardness Using ANOVA **Omar Bataineh** Jordan University of Science and Technology, Jordan ABSTRACT Roller burnishing is an important finishing operation that is widely used to improve metals' tribological properties such as surface finish and hardness. Burnishing speed and depth of interference are key process conditions when it comes to maximizing the benefits gained from this operation. This study aims to optimize these two parameters in the case of roller burnishing of 6061-T6 aluminum rods in terms of their impact on surface roughness and hardness. To achieve results that are sound statistically, data collected from carefully designed factorial experiments were analyzed using the analysis of variance (ANOVA) approach. Mintab® was the statistical software of choice used to conduct actual computations and analysis of the data. Results showed that both surface roughness and hardness were improved. Surface roughness was reduced on average by 87.6% while hardness was increased on average by 14.5%.
MS037 14:45-15:00	Path Planning for Spray Painting Robot of Horns Surfaces in Ship Manufacturing **Zhou Yunzhong**, Ma shumei, Li aiping and Yang liansheng Tongji University, China ABSTRACT Generating paint gun path for complex free-form surfaces in shipbuilding industry to ensure uniform paint deposition is highly challenging due to their complex geometry, especially for horns surfaces. In this paper, a tool trajectory optimization method was proposed based on dip angle spray in order to solve the problems of poor coating uniformity and material waste for spraying horns surface with curved patches. A dip angle spray model was developed based on the Beta distribution model on the planar surface by principle of differential geometry. The spray path optimization models for dip angle spraying on cylindrical surfaces of three cases were proposed and compared first to define the best case which yields the best painting quality. Then we used the best strategy on a horns surface in a shipyard to evaluate the effectiveness and robustness of designed algorithm. This algorithm can also be extended to other applications.
RT1002	Controller Design and Trajectory Tracking of a Two-Link Robotic Orthosis via Sinusoidal-Input

15:00-15:15	Describing Function Model **Kar Mun Chin**, Sze-Hong Teh, Jee-Hou Ho and Hoon Kiat Ng University of Nottingham, Malaysia Campus, Malaysia ABSTRACT This paper presents an application of controller design using sinusoidal-input describing function (SIDF) for a two-link robotic orthosis, which is a non-linear multivariable system. A controller based on closed-form solution of lead-lag compensator is generated via unified approached technique. The performance of the controller is evaluated with step response, tracking and decoupling qualities as well as the trajectories tracking and this is compared with the conventional PID controller.
MS043 15:15-15:30	Effects of machining parameters on surface roughness when ultra-high precision diamond turning RSA443 optical aluminium Zwelinzima Mkoko and **Khaled Abou El Hossein** Nelson Mandela University, South Africa ABSTRACT Surface roughness is generally considered as a good indicator of the quality of machining processes. In the globally competitive environment surface roughness, quality and finer tolerances are becoming stringent and certainly most critical for machined components. The aim of this study is to determine the effects of process parameters, cutting speed, feed rate and depth of cut on surface roughness when diamond turning RSA 443 alloy with high silicon content. This alloy is one of newer grades that has a potential to be used for production of optical and support components. The ultra-high precision manufacturing industry is in a relentless pursuit to experiment and validate newer materials that can lead to better functioning of components, reduction of costs and shortening of production processes. The experiments were conducted based on the Box-Behnken design with parameters varied at three levels. A mathematical regression model was developed in terms of the machining parameters for predicting surface roughness. Further, the analysis of variance (ANOVA) was used to analyse the influence of cutting parameters and their interaction in machining. The developed model prediction revealed that speed and feed rate were the most dominant factors influencing surface roughness.
MS033 15:30-15:45	Exploring Pro-environmental Behaviors among Thai People in Bangkok Metropolitan Region **Walailak Atthirawong** and Wariya Panprung King Mongkut's Institute of Technology Ladkrabang, Thailand ABSTRACT This paper focuses on the analysis of level of knowledge, awareness, and attitudes towards pro-environmental behaviors among people in Bangkok Metropolitan region. The sample study comprises of 326 respondents from 6 provinces in Thailand who had 15 years old and above which questionnaires were used as instrument of survey. The results of Pearson Correlation showed a significant relationship between awareness and attitude on pro-environmental behaviors among respondents. However, environment knowledge was not statistically significant correlated with other variables. Further analysis, Multiple Regression Analysis reveals a significant positive association between the respondents' pro-environmental behaviors and the two determinant factors i.e. attitudes and awareness. This study contributes to the literature by

	explaining the links between environmental awareness, attitudes, knowledge and real pro-environmental behaviors and defines the strength and direction among these variables. The findings generated from the study could help environmental management planners to establish policies and standards in order to encourage sustainable development.
MS009 15:45-16:00	Application of Multiple Methods of NDT for the Evaluation of Welded Joints in a Steel Bridge ASTM-A-588 Héctor C. Terán, Oscar Arteaga, Francisco Alcocer, **Richard Fernando Navas Jácome**, Stalin Mena P. and Eduardo Cárdenas A. Universidad de las Fuerzas Armadas ESPE, Sangolquí, Ecuador ABSTRACT This work is based on making a comparison of different inspection methods of non-destructive testing (NDT), to detect porosity, bite, undercut, splash, overlap, slag, concavity, lack of fusion and damage to base material, in welds of shielded metal arc welding (SMAW) and flux-cored arc welding (FCAW), made on a steel bridge ASTM-A-588. The main application of non-destructive tests is to evaluate the final state of a welded joint in critical points, in addition the fundamental objective is to ensure that the established acceptance and rejection criteria are met rigorously. For which non-destructive techniques are analyzed, such as the visual testing of welding on the beams of a bridge of length 35000 mm, subsequently, tests of inspection by liquid penetrant were used, based on the AWS D1.5 standard to confirm the failures in welded joints in ABA webs, an ultrasonic is also carried out using an SIUI CTS 602 equipment, finally to issue an acceptance and rejection criterion as determined by ASTM E165 and ASTM E2544-09.

✧ Tips:

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The best presentation will be chosen after each session and the certificate will be awarded by the chair. Good Luck!

Session 2: Composite Materials and Structures

Chair: Asst. Prof. A S Mohammad Sayem Mozumder, UAE University, United Arab Emirates

Time: 14:20—15:50

Venue: Conference Room-2F

MS003 14:20-14:35	A modified Peric model for Al-Mg alloy sheet with rate-independent initial yield stress at warm temperatures **Yong Zhang**, Qing Zhang, Yuantao Sun and Xianrong Qin Tongji University, China ABSTRACT The constitutive modeling of aluminum alloy under warm forming conditions generally considers the influence of temperature and strain rate. It has been shown by published flow stress curves of Al-Mg alloy that there is nearly no effect of strain rate on initial yield stress at various temperatures. However, most constitutive models ignored this phenomenon and may lead to inaccurate description. In order to capture the rate-independent initial yield stress, Peric model is modified via introducing plastic strain to multiply the strain rate, for eliminating the effect of strain rate when the plastic strain is zero. Other constitutive models including the Wagoner, modified Hockett–Sherby and Peric are also considered and compared. The results show that the modified Peric model could not only describe the temperature- and rate-dependent flow stress, but also capture the rate-independent initial yield stress, while the Wagoner, modified Hockett–Sherby and Peric model can only describe the temperature- and rate-dependent flow stress. Moreover, the modified Peric model could obtain proper static yield stress more naturally, and this property may have potential applications in rate-dependent simulations.
MS008-A 14:35-14:50	Mechanical Properties of Woven Composite Materials reinforced with nanosilica Diyar Kaka, Rwar Nahro, **Sakar Azyz** and Hozan Halkawt Koya University, Iraq ABSTRACT Woven composite materials are receiving more interest in different fields of engineering due to ease of manufacture and ease of orientation allowing designers to set the stiffness and strength in desired directions. This research includes optimization of the mechanical properties of woven composite materials consist of woven carbon fibre reinforced thermoset polymer. Also, it explores the effect of adding nanosilica to the woven composite material. The mechanical properties are optimized based on the direction of the laminates of woven glass fibre with in the polymer. For that purpose, experimental and numerical methods were used. Experimentally, composites of woven glass fibre reinforced thermoset polymer of polyester were fabricated with using hand lay-up method with different orientation of the plies. Also,

	particles of nanosilica were added to the woven composite material to find its influence on the mechanical properties of the woven composite. Numerical method with using Ansys workbench (ACP) 18.0 was used to model woven composite materials in macro level. Several analyses were carried out on the woven composite materials with different loading direction and laminate orientation. From that, the results were compared to find the highest mechanical properties from different laminate orientation and loading direction.
MS011 14:50-15:05	Ballistic performance study of Kevlar29 Fibre Reinforced Polyester Composite **Sangamesh Rajole**, Shivashankar H, K S Ravishankar, and S M Kulkarni National Institute of Technology Karnataka Surathkal Mangalore, India ABSTRACT Ballistic qualities of the material are important for the military defence barrier application for protection of military persons, their vehicles and equipment. In the present investigation ballistic performance of Kevlar29 fibre reinforced polyester composite (KPC) is analysed. A definite parametric study, taking into account various shape of projectiles (Flat-F, Spherical-S and Conical-C) impact on the composite target of different thicknesses (12, 16 and 20 mm). Impact velocity of the projectile considered for analysis 100-400 m / s. Ballistic parameters such as residual velocity, deformation and penetration behaviour are predicted. Conical projectile has more effect on the composite target compared to other targets. Composite thickness influenced the energy absorption. The thickness increase from 12 mm to 20 mm which leads to increase in energy absorption by almost 20%.
MS014 15:05-15:20	Optimization of Bilayer Actuator Based on Carbon Black/Polymer Composites **Shivashankar Hiremath**, Sangamesh R and Satyabodh Kulkarni National Institute of Technology, Karnataka, India ABSTRACT In last few years, actuators based on polymer composite have been created for incredible potential applications in the zone of artificial muscle, micro-robots, relays, and energy harvesting. Polymer composites show larger deflection or bending due to the electrothermal and photothermal efforts. Subsequently, these have excellent orientation on the effect because of material properties and structure. In this study, Theoretical modeling is employed to understand and analyze the actuator performance by incorporating carbon black (CB) into the polymer material. Polydimethylsiloxane (PDMS) acts as a polymer matrix with bilayer geometry. The displacement of bilayer polymer composite is identified by the length and the thickness of two layers, the distinction of coefficients of thermal expansion (CTE) between bilayer and temperature change are inspected. Theoretical outcome demonstrates that the displacement is enormously affected by the thickness proportion of bilayer actuator. In this manner, it is optimized by upgrading thickness proportion and distinct parameters of the bilayer actuator. Thus, this investigation will give a hypothetical reference to the realistic design and realization of CB /PDMS composite based on a thermal input.
MS018 15:20-15:35	HDPE/TiO2 nanocomposite: Fabrication and optimization of mechanical property by RSM and ANN Anusha Mairpady, **A S Mohammad Sayem Mozumder** and Abdel-Hamid I. Mourad

	UAE University, United Arab Emirates ABSTRACT Polymeric nanocomposites have proven to be excellent candidate as biomaterials. However, materials and approaches used to improve the mechanical property of the polymer are still under scrutiny. In this study, improvement of mechanical property upon addition of nano-titanium oxide (n-TiO2), cellulose nanocrystal (CNC) and two different types of coupling agent was analyzed. Influence of the individual factors and its interaction with tensile strength was evaluated using analysis of variance. From the analyses of main effect and interaction effects, it could be concluded that n-TiO2 and CNC have major influence on the improving mechanical properties. Moreover, the coupling agent and compatibilizing agent did not have considerable effect on the mechanical properties. The central composite design was used to evaluate the best combination of n-TiO2 and CNC to be experimented. The responses were modeled and optimized using response surface methodology (RSM) and artificial neural network (ANN). The predicted data was in agreement with the experimental data. The modeling accuracy and efficiency is evaluated based on regression coefficient (R square value). Both the method had recommendable R square value. However, the R square value of the Artificial neural network (R2>95%) was higher than Response surface methodology (R2>70 %).
MS035 15:35-15:50	Effect of Volume Fraction And Resin System On Tensile, Compression And Flexural Strength OfElectrical Glass Fiber Reinforced Plastic Laminate **Madhav Murthy**, Kayala Mallikharjuna Babu and Peter Martin Jebaraj B.M.S.College of Engineering, India ABSTRACT This work deals with the experimental studies on effect of changing volume fraction and also various resin systems like Epoxy LY556, AW106 & CY230 on ultimate tensile, compression and flexural strength of a polymer matrix composite fabricated through resin transfer molding technique. The inferences are drawn for each type of resin system and volume fraction of the matrix and reinforcement used which helps in understanding the enhancement in ultimate strength of the test coupon under study.

16:00—16:20 Coffee Break

✧ Tips:

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Session 3: Metallic Materials and Chemical Engineering

Chair: Asst. Prof. Hamdi A. Al-Jamimi, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia

Time: 16:20—17:50

Venue: Lecture Hall-2F

MS006 16:20-16:35	Experimental description of aging of coconut shell powder/epoxy composite **Petr Valášek** and Karolína Habrová Czech University of Life Sciences Prague, Czech Republic ABSTRACT In the field of composite materials, in some areas, the current trend is the substitution of synthetic reinforcement by natural material. Biological reinforcements thus optimize the resulting mechanical characteristics in a number of cases, where the resulting material can be labeled as environmentally sensitive. The problem of biological materials can be their aging. For the specification of application areas of composite materials with biological reinforcement, it is necessary to know the stability of these materials over time. The paper describes the composite material with epoxy matrix and filler in the form of microparticles (100-200 μm) prepared from coconut shells (CSP/epoxy). Epoxy resin for joining materials in engineering was filled with 2.5, 5.0 and 10.0 wt.% of CSP, and resin used for vacuum infusion was filled with 30 wt.% of CSP (different kind of preparation of composite systems) . For an experimental description of aging was used degradation chamber, where both, the humidity and temperatures in each cycle were changed + 70 °C/-40 °C. An important indication of mechanical aging was used to describe aging, namely shear strength and tensile strength. The degradation period was 5 weeks, corresponding to 35 cycles, i.e. 840 hours of degradation. During the degradation time, the shear strength of the CSP composite dropped to 42.2%, the tensile strength of the prepared infusion system dropped by 49.6%.
MS004 16:35-16:50	Microstructure, texture and mechanical properties of Al alloy 380 prepared by directional solidification method **Hemant Borkar**, Salem Seifeddine and Anders E. W. Jarfors IIT Indore, India ABSTRACT The mechanical properties of Al-Si alloys are affected by several microstructural features such as secondary dendrite arm spacing (SDAS), size and shape of eutectic Si-particles, presence of intermetallics as well as by porosity. In the current study, Al-Si-Cu alloy A380 was prepared by a unique directional solidification method to produce samples with two different SDAS of 9 μm and 27 μm. The lower solidification rate resulted in larger SDAS, larger grain size, larger eutectic Si and larger intermetallics including Fe-rich β phase. The microstructure with higher solidification rate was found to be finer and more homogeneous

	with smaller eutectic Si and intermetallics. The specimen with larger SDAS exhibited stronger texture than the one with smaller SDAS. The specimen with smaller SDAS showed improved mechanical properties including YS, UTS and ductility.
MS027 16:50-17:05	On the Prediction of Residual Magnesium and Nodularity in Ductile Iron by Thermal Analysis Sarum Boonmee, Kittirat Worakhut, **Auttachai Utsajai**, Nupol Mai-Ngam and Suphalerk Rassamipat Suranaree University of Technology, Thailand ABSTRACT Morphology of graphite affects the mechanical and physical properties of cast irons. It is known that the spheroidal shape of graphite promotes both tensile strength and ductility. The morphology of graphite is generally quantified by the percent nodularity and/or graphite shape factors (e.g. roundness, sphericity, compactness, aspect ratio). From the quality control aspect, the nodularity is controlled by the residual magnesium content determined by the Optical Emission Spectrometry (OES). However, the nodularity is also affected by the cooling rate and the sulfur level. Therefore, the percent nodularity alone cannot be precisely predicted by the residual magnesium. In this study, the Thermal Analysis (TA) was used to predict the residual magnesium and the nodularity of ductile iron. The newly created TA demonstrated the reliable prediction as the effect of the residual magnesium, sulfur level and the cooling rate were combined in forms of cooling curves. The correlations of the residual magnesium, the Maximum Cooling Rate (MCR) and the angle of the cooling rate curve ( ) at the end of solidification were shown in this work. Finally, the relationships were used to encode in the software for the on-site prediction.
MS013 17:05-17:20	Physical - mechanical characterization applied to the adhesion of electrolytic metal chromium plating on bus rims surfaces Mario A. Lara, Miguel A. Carvajal, Oscar Arteaga, Héctor C. Terán, **Richard Fernando Navas Jácome**, Guido R. Torres and Segundo Espín ABSTRACT This experimental investigation evaluates the adherence of metal chromium plating on SAE -1026 cold-formed carbon steel surfaces for bus rims, the test-pieces were prepared in compliance with the ASTM-B456 standard regarding their size and surface. The study involves varying the parameters of the coating process, such as time, temperature and voltage, with the selection of critical tests that influence the adhesion of chromium plating such as: adhesion test where the strength with which the metallic coating is bonded to another surface was obtained based on ASTM D 3359-09, Vicker hardness test with the resistance that the material exhibits against permanent deformation established by ASTM B578-87, thickness test in the coating of metal substrates applying ASTM B456 and corrosion test by subjecting the surface to acetic salt mist (AASS) under strict preparation, cleaning and evaluation of ASTM G46-94. The optimal results discovered are 60 min. 40 0C and 7V in the nickel bath and 2min. 15 0C and 6V in chrome. In order to improve the results obtained from the experiments, the proposal is to cover with a layer of alkaline copper coating, reducing the anti-corrosion and adhesion properties.
MS025 17:20-17:35	Zinc Oxide Nanostructures Fabricated Under Extremely Non-Equilibrium Plasma Conditions **Onkar Mangla** and Savita Roy

	University of Delhi, India ABSTRACT In the present work, extremely non-equilibrium, high temperature and high density argon plasma is used for producing ions from pellet of zinc oxide (ZnO) fitted on top of anode. These ions along with energetic argon ions move vertically upward in a fountain like structure in post focus phase of plasma dynamics and material ions get deposited on the glass substrates placed at 4.0 cm from anode top. This process of production of material ions from ZnO pellet leads to nucleation and nanostructures formation with one and two bursts of focused plasma. The surface morphology studied using scanning electron microscopy shows the formation of nanostructures with mean size about 8 nm. The structural properties of nanostructures in X-ray diffraction pattern show [100] and [002] planes of hexagonal ZnO. Photoluminescence studies show peaks related to defect transitions. The band-gap of nanostructures found from Tauc plot is smaller than that of the bulk ZnO. The resultant morphological, structural and optical properties of nanostructures suggest the possible applications in visible optoelectronic devices.
MS002 17:35-17:50	Prediction of sulfur content in desulfurization process using a fuzzy-logic based model **Hamdi A. Al-Jamimi** King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia ABSTRACT In petroleum industry, hydrodesulphurization (HDS) process is considered as one of the crucial catalytic units in which the sulfur is mostly eradicated. The modeling of HDS process is very important for the proper understanding of the process operation to be optimized. The studies conducted, in this area, focused on predicting parameters using analytical, empirical and numerical approaches. However, a typical desulfurization process is constantly faced with an uncertainty, which should be considered in a reasoning way. Therefore, this work aims to explore the use of fuzzy logic (FL) inference system in creating models of the HDS process for the prediction of sulfur reduction from oil. In order to validate the proposed model, we employed experimental data from the HDS setup. The simulated sulfur content results obtained from the proposed model correspond closely to the real experimental values. The outstanding performance of the developed FL-based model suggests its potential in predicting sulfur content for optimization of the HDS process. The model demonstrates promising results in terms of high correlation (R2=0.98) and minimal percentage of error (AARE=0.072).

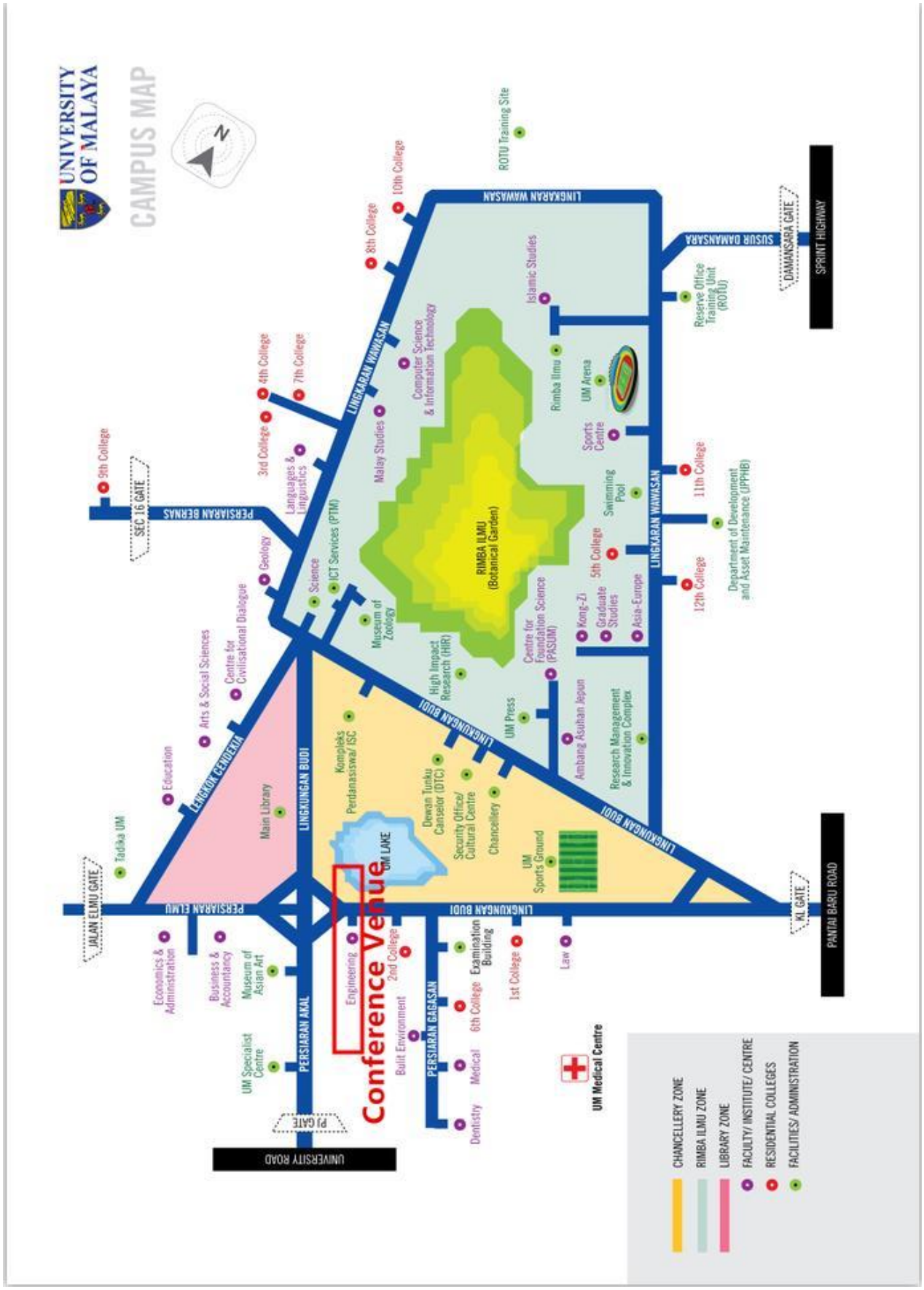
Poster Session

MS016	Redesign of the Front Suspension Vehicle Prototype for Formula SAE Competition Víctor D. Zambrano, Lenin P. Sangopanta, Juan C. Palacios, Wilson E. Sánchez, Guillermo M. Cruz and Jorge S. Mena UNIVERSIDAD DE LAS FUERZAS ARMADAS, Ecuador Abstract Through the use of structural topological optimization applied to the redesign of the front suspension components of the Formula SAE FESPE 2012 racing prototype and the implementation of materials such as aluminum Al 6061T6 and Al 7075T6 will improve vehicle maneuverability and stability. Analysis: The front and lateral geometry of the front suspension was redesigned, later on by means of a kinematic analysis to obtain the system's dynamic behavior curves and with the development of components through CAD/CAE software (Autodesk Inventor Professional), and supported by a FEA analysis (ANSYS), the maximum stress values in critical operating conditions of the suspension are obtained. Results: The results indicated a mass reduction of about 20.96% for the entire front suspension system, the use of materials such as Al 6061-T6 aluminum axles with an elastic yield stress Sy=276 MPa and Al 7075-T6 aluminum blocks (Sy=503), for CNC machining have a high mechanical resistance capable of withstanding the maximum stresses generated in the movement of the suspension and through the redesign of the geometry, the correct configuration of the camber and caster angles and the height of the rolling center was determined to obtain the maximum grip of the tyre that will provide reliability to the prototype. New/Improvement: A topological optimization study is carried out to improve the structural shape of the component and thus obtain an adequate reduction in the mass of the component, in order to achieve better results in terms of the safety factor of the dynamic design (fatigue).
MS019	Effect of Ga and Gd as catalyst in ZnO/reduced graphene oxide composites uponphotodegradation process Suntree Sangjan and Khanittha Ponsanti Kasetsart University, Kamphaeng Saen campus, Thailand Abstract Photocatalytic degradation was improved by addition of gallium (Ga) and gadolinium (Gd) as catalysts for zinc oxide/reduced graphene oxide (ZnO/rGO) composites. Preparation, physical characterisation, dye degradation, photocatalytic activity and kinetic mechanisms of Ga-ZnO/rGO and Gd-ZnO/rGO composites were investigated. Physical characteristics of the composites were studied using Fourier transform infrared spectroscopy (FT-IR), X-ray diffractometry (XRD) and transmission electron microscopy (TEM). Photocatalytic activity of the composites was investigated by degradation of reactive blue dye solution as a function of contact time, catalyst type and catalyst concentration. Results indicated that Ga-ZnO/rGO (2 wt%Ga) and Gd-ZnO/rGO (0.6 wt%Gd) were capable of dye degradation at 62.76% and 54.43% respectively under UV irradiation for 3 h with the photocatalytic

	process described by pseudo first order kinetics as 0.0059 and 0.0058 min-1. Findings confirmed that addition of Ga and Gd in composite systems enhanced removal of reactive blue dye solution. Optimum conditions were recorded for Ga 2 wt% and Gd 0.6 wt% in ZnO/rGO composite. Results indicated that Ga-ZnO/rGO (2 wt%Ga) and Gd-ZnO/rGO (0.6 wt%Gd) showed promise for removal of reactive blue dye.
MS028	Multi-Objective Scheduling Simulation of Adaptive Job Shop SOMA Algorithm Danding Jiang, Mingwei Wang, Ying Zhao and Tengyuan Jiang Northwestern Polytechnical University, China Abstract In this paper, an effective modified Self-Organization Migrating Algorithm (SOMA) is proposed to solve multi-objective adaptive job shop scheduling with the criterion to minimize the processing cost, minimize makespan, minimize total machine loads. The modified SOMA stresses the balance between global exploration and local exploitation by introduce adaptive step, and improved the population diversity in the process of individual migration by introduce quadratic interpolation, which effectively avoided the premature and improved the convergence of the SOMA. Finally, through the 4×6 job shop scheduling problem verify the performance of the modified SOMA algorithm, the computational results show that the proposed modified SOMA efficiently solves adaptive job shop scheduling.
MS029	Geometric modeling and manufacturing method for a few teeth involute gear with bilateral modification Qiang Sun, Yuehai Sun and Xiaolin Ge TianJin University, China Abstract Aiming at the issue of undercutting and machining difficulties caused by a fewer gears with a fewer teeth,the geometric modeling method and processing method of bi-directional displacement less tooth number were studied. Based on the calculation formula of the involute cylindrical gear and the characteristics of the bi-directional gear, the calculation formula of the diameter of the variable tooth top circle is derived, and the modeling of the gear pair with bi-directional variable bit number is carried out. The research shows that the bidirectional displacement can solve the root cutting problem well and improve the transmission quality. In view of the problem that machining efficiency is not high at present, a method of machining with tangent and radial gear is proposed, and the same gear cutter is used to process different cutting and radial gears, and the feasibility of the above method is verified by the processing test. The research work laid a foundation for further promotion and application of small tooth number gear transmission.
MS039	Adsorption and photocatalytic kinetic of wastewater treatment by photocatalyst - alginate/polyvinyl alcohol composite beads Suntree Sangjan and Khanittha Ponsanti Kasetsart University, Kamphaeng Saen campus, Thailand Abstract Photocatalyst composite beads were applied as adsorbent substances in the waste water treatment process. The beads were synthesised using different photocatalyst types in

	sodium alginate-polyvinyl alcohol matrix (SA-PVA) as commercial ZnO (ZnO/SA-PVA), synthesised ZnO (ZnO(syn)/SA-PVA), and synthesised ZnO-graphene oxide (ZnO(syn)-GO/SA-PVA). The morphology and photocatalytic activity of the composite beads were studied utilising X-ray diffractometry, Fourier transform infrared spectroscopy and UV-vis spectroscopy. Photocatalytic activity was studied by methylene blue removal, pseudo-first order rate (k1), pseudo-second order rate (k2), the kinetics of adsorption at equilibrium (qe), pseudo-first (K1) and pseudo-second (K2) order adsorption kinetics. The results confirmed that photocatalytic activity was enhanced by the addition of GO in the photocatalyst composite beads. The results confirmed that the MB removal efficiency of ZnO(syn)-GO/SA-PVA composite bead was the best for all conditions described by k1, k2 and qt at around 0.0139 min-1, 0.0302 L.mg-1min-1 and 8.818 mg.g-1, respectively, under visible irradiation. In addition, the adsorption kinetics system was considered by the pseudo-first order and pseudo-second order adsorption kinetics, in which ZnO(syn)-GO/SA-PVA composite beads were around 0.0259 min-1 and 0.232 g.mg-1min-1, respectively.

UM Map


UNIVERSITY OF MALAYA
CAMPUS MAP
N
ROTU Training Site
10th College
8th College
LINGKARAN WAWASAN
SUSUR DAMANSARA
DAMANSARA GATE
SPRINT HIGHWAY
Islamic Studies
Reserve Office Training Unit (ROTU)
Computer Science & Information Technology
4th College
7th College
Rimba Ilmu
UM Arena
Malay Studies
Sports Centre
3rd College
9th College
Languages & Linguistics
Swimming Pool
11th College
PERSIARAN BERNAS
SEC 16 GATE
ICT Services (PTM)
RIMBA ILMU (Botanical Garden)
Department of Development and Asset Maintenance (UPPHB)
Geology
Science
5th College
Kong-Zi
Graduate Studies
Asia-Europe
12th College
Centre for Civilisational Dialogue
Museum of Zoology
Centre for Foundation Science (PASUM)
Arts & Social Sciences
High Impact Research (HIR)
LINGKUNGAN BUDI
UM Press
Komleks Perdanasiswa/ ISC
Education
Ambang Asuhan Jejaun
Research Management & Innovation Complex
LENGKOK CENDEKIA
Dewan Tunku Canselor (DTC)
Main Library
Security Office/ Cultural Centre
Chancellery
Tadika UM
UM LAKE
UM Sports Ground
JALAN ELMU GATE
PERSIARAN ELMU
KL GATE
PANTAI BARU ROAD
Economics & Administration
Business & Accountancy
Museum of Asian Art
Engineering
2nd College
Examination Building
Law
1st College
PERSIARAN AKAL
PERSIARAN GAGASAN
UM Specialist Centre
Built Environment
6th College
Medical
Dentistry
PJ GATE
UNIVERSITY ROAD
Conference Venue
UM Medical Centre
CHANCELLERY ZONE
RIMBA ILMU ZONE
LIBRARY ZONE
FACULTY/ INSTITUTE/ CENTRE
RESIDENTIAL COLLEGES
FACILITIES/ ADMINISTRATION

Note