

# FRONT PAGE

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**2018 5th International Conference on Mechatronics and  
Mechanical Engineering (ICMME 2018)**

第五届机电与机械工程国际会议

**2018 3rd International Conference on Functional Materials and  
Metallurgy (ICFMM 2018)**

第三届功能材料与冶金国际会议

**Wuhan, China | November 10-12, 2018**

2018 年 11 月 10-12 日 | 中国·湖北·武汉

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# CONTENTS

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<b>Venue</b>	<b>1</b>
<b>General Agenda at a Glance</b>	<b>4</b>
<b>Welcome Address</b>	<b>8</b>
<b>Introduction of Keynote Speakers</b>	<b>9</b>
<b>Parallel Sessions</b>	<b>14</b>
Session I	14
Session II	21
Session III	26
Session IV	31
Poster Session	37
Memos	45

# VENUE

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## China University of Geosciences



**Address: No. 388 Lumo Road, Wuhan, China**

**中国湖北省武汉市洪山区鲁磨路 388 号**

### Mass transport (From Tianhe Airport)

**Subway Line 2** ➡ Guanggu Square Station (Optical Valley Square Station) • 光谷广场站  
➡ Walk to Luoyululuxiang Station • 珞喻路鲁巷站 and take **Bus 59/401/72/702** ➡  
China University of Geosciences • 鲁磨路地质大学站 (Approximately 110 minutes)

**Airport Bus Line 1(08:30-18:30)** ➡ Fujiapo Coach Terminal Station • 武珞路傅家坡(傅家坡客运站)站 ➡ Bus 401 ➡ China University of Geosciences • 鲁磨路地质大学站 (Approximately 130 minutes)

**Taxi:** It may take **1 hour** and cost approximately **140 RMB** to get to China University of Geosciences.

**Local Temperature: 11/20°C**

### Emergency

**Ambulance: 120**

**Police: 110**

# VENUE

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## Campus Map

(The location where is marked a red star is the conference venue.)



# VENUE

## West area of the campus

(The location where is marked a red star is the conference venue.)



# AGENDA

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[November 10, 2018]



10:00-17:00



Room 303, 3rd Floor @ No.2 Teaching Building, West Area of the campus • 西区教二楼303会议室



China University of Geosciences • 中国地质大学（武汉）



Registration & Conference Kits Collection

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Give your **Paper ID** to the staff



Sign your name in the attendance list and check the paper information



Check your **conference kit**, which includes conference bag, name tag, lunch & dinner coupon, conference program, the receipt of the payment and an USB drive with paper collection



## Tips for Participants

- ✧ Your punctual arrival and active involvement in each session will be highly appreciated.
- ✧ The listeners are welcome to register at any working time during the conference.
- ✧ Get your presentation PPT or PDF files prepared.
- ✧ Regular oral presentation: 15 minutes (including Q&A).
- ✧ Laptop (with MS-Office & Adobe Reader), projector & screen, laser pointer will be provided by the conference organizer.
- ✧ Please keep all your belongings (laptop and camera etc.) with you in the public places, buses, metro.

# AGENDA

[November 11, 2018]



**Morning**



China University of Geosciences • 中国地质大学 (武汉)



Room 301, 3rd Floor @ No.2 Teaching Building, West Area of the campus

西区教二楼 301 会议室



## Speeches

<b>Chaired by</b> Prof. Puneet Tandon, Indian Institute of Information Technology, Design and Manufacturing Jabalpur, India	
09:00-09:10	<b>[Opening Remarks]</b> By Prof. Huafeng Ding, China University of Geosciences, China
09:10-09:50	<b>Keynote Speech</b> [Lead-free Pyroelectric Ceramics for Infrared Sensors] By Prof. Lu Li, National University of Singapore, Singapore
09:50-10:30	<b>Keynote Speech</b> [Industrial Internet and Intelligent Manufacturing] By Prof. Zhijie Xia State Specially Recruited Expert of National 1000 Talent's Plan Director of Innovation Center of Jiangsu Provincial Advanced CNC Machine and Intelligent Equipment, China
10:30-11:00	 <b>Coffee Break &amp; Group Photo &amp; Poster Display</b> 
	<b>Posters-</b> ME001, ME020, ME022, ME024, ME2003, ME3006, ME013, ME027, ME037, ME2-001, ME3003, ME3007, ME1006, ME2002, ME004, ME009, ME029, ME014
11:00-11:30	<b>Invited Speech</b> [Recent Advancement in the Electrical Discharge Machining Process] By Prof. Dr. Mohd Hamdi Abdul Shukor, University of Malaya, Malaysia
11:30-12:00	<b>Keynote Speech</b> [Revolution in Manufacturing through Additive Manufacturing and Industry 4.0] By Prof. Puneet Tandon, Indian Institute of Information Technology, Design and Manufacturing Jabalpur, India



<12:00-13:30>

**Lunch @** 中国地质大学震旦园

# AGENDA

[November 11, 2018]



Afternoon



China University of Geosciences • 中国地质大学（武汉）

<p> Room 301, 3rd Floor @ No.2 Teaching Building, West Area of the campus 西区教二楼 301 会议室</p>	
13:30-14:00	<p><b>Invited Speech</b> [Blended Wing Body Aircraft: Progress and Challenges] By Prof. Wirachman Wisnoe, Universiti Teknologi MARA, Malaysia</p>
<p><b>Session I—Mechanical Design Manufacturing and Automation</b> Chaired by Assoc. Prof. Hongjun Li, Zhejiang Sci-Tech University, China (14:00-17:00)</p>	
14:00-15:45	<p><b>[ Part 1 ] 7 Presentations</b>—ME3004, ME3005, ME031, ME003, ME2001, ME2006, ME2-1005</p>
15:45-16:00	<p> <b>Coffee Break</b></p>
16:00-17:00	<p><b>[ Part 2 ] 4 Presentations</b>—ME3009, ME2-002, ME030, ME008</p>
<p><b>Session II—Modern Electronic System &amp; Measurement and Control Technology</b> Chaired by Assoc. Prof. Liu Xiaogang, Wuhan University of Technology, China</p>	
17:00-19:15	<p><b>9 Presentations</b>—ME005, ME018, ME019, ME026, ME3001, ME033, ME035, ME036, ME012,</p>
<p> Room 314, 3rd Floor @ No.2 Teaching Building, West Area of the campus 西区教二楼 314 会议室</p>	
<p><b>Session III—Electronic Power and Intelligent Control</b> Chaired by Prof. Yu-Chi Wu, National United University, Taiwan</p>	
13:30-15:45	<p><b>9 Presentations</b>—ME1004, ME002, ME041, ME021, ME034, ME007, ME017, ME2-1002, ME032</p>
15:45-16:00	<p> <b>Coffee Break</b></p>
<p><b>Session IV—Engineering Material Design and Analysis</b> Chaired by Prof. Dao Hua Zhang, Nanyang Technological University, Singapore</p>	
16:00-18:30	<p><b>10 Presentations</b>—ME2-006, ME2-004, ME2-1004, ME2-2001, ME2-2003, ME2-2004, ME2-005, ME2-2002, ME2-007, ME2-008</p>



Dinner @ 中国地质大学震旦园

<19:15-20:30>

# AGENDA



[November 12, 2018]

## Social Program

<p><b>08:30 AM-05:00 PM</b></p> <p><b>Gathering Place: China University of Geosciences</b></p>	
	<p><b>Departure Point</b> - China University of Geosciences</p>
	<p><b>Itinerary:</b></p> <p>➤ East Lake (东湖磨山风景区) ➤ Wuhan Central Cultural Zone (楚河汉街)</p> <p>➤ Yellow Crane Tower (黄鹤楼) ➤ Tanhualin Block (昙华林)</p>
	<div> <div> <p><b>East Lake</b></p> </div> <div> <p><b>Wuhan Central Cultural Zone</b></p> </div> </div> <div> <div> <p><b>Yellow Crane Tower</b></p> </div> <div> <p><b>Tanhualin Block</b></p> </div> </div>
	<p><b>Return details</b> - China University of Geosciences</p>

### Inclusions:

- ✧ Tickets for Yellow Crane Tower
- ✧ Comfortable tour bus and English tour guide
- ✧ Accident Travel insurance

### Exclusions:

- ✧ Meals (We will not provide meals during this schedule.)

### Attention:

- ✧ Please keep your belongings with you.
- ✧ If you are interested, please give your feedback before or on November 1st. If you miss this date, we can't accept your request anymore.
- ✧ Please arrive the assembly point 10 minutes earlier. Thanks for your kind understanding!
- ✧ The tour will be canceled if the participants are less than 5 people.

# WELCOME

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Dear professors and distinguished delegates,

It's our great honor and pleasure to welcome you to the 5th International Conference on Mechatronics and Mechanical Engineering (ICMME 2018) and the 3rd International Conference on Functional Materials and Metallurgy (ICFMM 2018) held in Wuhan, China during November 10-12, 2018.

ICMME 2018 is not one which is isolated, but one of a continuing program of activities. ICMME 2018 is the 5th in a series that has been held annually in Chengdu (China), Singapore, Shanghai (China), Kuala Lumpur (Malaysia) in the past 4 years. In 2019, ICMME will be held in Kitakyushu (Japan). In addition, this conference is held in conjunction with ICFMM 2018 providing great opportunity for participants to meet delegates in Functional Materials and Metallurgy fields to exchange their ideas and research work.

We are pleased to have 57 presentations out of 102 submissions from 7 countries and regions, such as China, Taiwan, Singapore, India, Malaysia, Indonesia, and South Korea, which are expected to make sufficient communication on multiple scales and disciplines, make detailed discussion of the topics between the presentations, and come up with feasible approaches to strengthen international cooperation and advance the frontier of Mechatronics and Mechanical Engineering and Functional Materials and Metallurgy during the conferences.

We would like to welcome all of the conference participants, keynote speakers, plenary speakers, presenters of technical papers and posters, our sponsors, associates and members of the organizing and technical program committees.

Our wish is that you will enjoy this conference, contribute effectively toward it and take back with you knowledge, experiences, contacts and happy memories of this conference.

Yours sincerely,

Conference Organizing Committee

# SPEAKERS

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**Prof. Lu Li**

**National University of Singapore, Singapore**

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Lu Li received his B.Eng and M. Eng from Tsinghua University, China, and his Ph.D from the Katholiek Universiteit Leuven, Belgium. After four years of doctoral study and two years of post-doctoral work at the Department of Metallurgy and Materials Engineering, Catholic University of Leuven, Belgium.

He joined the Department of Mechanical Engineering, National University of Singapore in 1991 and is a Full Professor. Dr. Lu is involved in the research of functional materials, mainly in two directions: i) materials for Li-ion rechargeable batteries which include traditional bulk batteries and all-solid-state batteries, and for supercapacitors, and ii) piezoelectric and ferroelectric materials. More recent years Dr. Lu has been heavily involved in development of thin film batteries, and Li-ion conductors for air-batteries.

Dr. Lu is the Editor-in-Chief of Functional Materials Letters, and Associate Editor of Materials Technology particularly in charge of functional materials. He is also Chairman of Functional Materials Society.

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**Title---**Lead-free Pyroelectric Ceramics for Infrared Sensors

**Abstract---**Currently almost of all materials used for pyroelectric ceramics and thin films are based on lead titanate (PZT) due to extraordinary pyroelectric performance. However, heavy metal of lead is extremely toxic and most countries will soon ban use of lead in any products. As such it is urgent and also necessary to develop new materials for pyroelectric applications. We have developed several kinds of materials and processing technology in order to achieve his figure of merit FoM through change Curia temperature, texture growth and compositional modification.

This presentation presents some of notable achievement of high FoE of the lead-free pyroelectric ceramics.

# SPEAKERS

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**Prof. Zhijie Xia**

**State Specially Recruited Expert of National 1000 Talent's Plan**

**Director of Innovation Center of Jiangsu Provincial Advanced CNC Machine and Intelligent Equipment, China**

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Dr. Zhijie Xia is a state specially recruited expert of National 1000 Talent's Plan. His main research fields are robotics, intelligent manufacturing, industrial Internet and industrial big data. He is currently the director of the Innovation Center of Jiangsu Provincial Advanced CNC Machine and Intelligent Equipment, and the CEO of Jiangsu Nangao Intelligent Equipment Innovation Center Co., Ltd. He is also the specially invited representative of the 12th CPPCC Committee of Jiangsu Province, vice president of Jiangsu 1000 Talent's Plan Expert Federation and the chairman of Intelligent Manufacturing Committee, standing director of Jiangsu European and American Students Association, adjunct professor of Southeast University, China University of Geosciences (Wuhan), Yunnan University and Central South-Central Minzu University.

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**Title---**Industrial Internet and Intelligent Manufacturing

**Abstract---**Industrial Internet technology enables the connection and communication of a large number of industrial equipment and products and makes it possible to collect massive industrial data and obtain industrial intelligence. The combination of industrial Internet and manufacturing technology will transform traditional manufacturing into intelligent manufacturing which will greatly improve production efficiency and rapidly increase productivity.

# SPEAKERS

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**Prof. Dr. Mohd Hamdi Abdul Shukor**

**University of Malaya, Malaysia**

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Professor Ir 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, and a professional engineer registered with the Board of Engineers Malaysia. 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 160 ISI journals and h-index of 26. 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.

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**Title---** Recent Advancement in the Electrical Discharge Machining Process

**Abstract---** With the progress in material science, such as the introduction of high hardness alloys and nano-structured materials, machining processes face increasing demand to attain high productivity. Powder Mixed EDM (PMEDM) as one of the recent technologies to enhance Electrical Discharge Machining (EDM) performance, facilitates producing parts with predominantly high surface quality and material removal rate (MRR). Introduction of a novel process of suspending micro-MoS<sub>2</sub> powder in dielectric fluid and using ultrasonic vibration during micro-EDM process indicated a significant increase in MRR and improvement of surface quality by providing a flat surface free of black carbon spots. Similarly, ultrasonic vibration of dielectric fluid containing graphite powder as the cheapest and most common powder material was investigated in nano-size, which demonstrated significant reduction of machining time up to 35% as well as increasing the machining accuracy. Moreover, low-frequency vibration of workpiece in nanographite PMEDM was deployed to enhance the debris ejection from machining gap. The experimental results showed that combination of these techniques improved machining stability, assured continuous machining processes, and significant reduction of the machining time. In cutting extremely difficult-to-cut material of Inconel 718 due to short circuiting and arcing, the surface of micro-holes produced by micro-EDM has black traces and cones. Utilization of 50 nm MoS<sub>2</sub> powder could produce higher quality micro-holes in machining Inconel 718. Most recently, addition of Ti nanopowder to dielectric in EDM resulted in substantial improvement of MRR, surface roughness and micro-defects formation on the machined surface due to discharge energy dispersion. The addition of powders in the process has improved the overall EDM performance.

# SPEAKERS

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**Prof. Puneet Tandon**

**Indian Institute of Information Technology, Design and Manufacturing  
Jabalpur, India**

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Prof. Puneet Tandon is a joint Professor of Mechanical Engineering, and Design at Indian Institute of Information Technology, Design and Manufacturing Jabalpur, India. He is also at present serving as Dean of Research, Sponsored Projects & Consultancy. His primary research interests are Innovative Product Design, Computer Aided Design, Computational Support to Product Design, and Hybrid Manufacturing. He is mentor of deLOGIC Lab (<http://delogic.iiitdmj.ac.in>), and Soln Lab (<http://soln.iiitdmj.ac.in>).

He graduated in Mechanical Engineering from National Institute of Technology Kurukshetra, India. He received his Masters and Doctoral degrees in Mechanical Engineering from Indian Institute of Technology Kanpur, India. He has authored more than 160 papers in referred journals and international conferences of repute. He has been to author to one text book titled “Cutting Tool Geometry: 3D Perspective” and a few conference proceedings. He was also organizer of International Conference on Innovations in Design and Manufacturing (InnDeM) 2012 and Design Workshop (DeW) 2010, 2013, 2014 and DeW 2015. Design Workshop, DeW is an international event organized in collaboration with Ministry of Foreign Affairs (MOFA), Japan. He is also the Principal Coordinator of DeW 2016, to be organized from December 12-14, 2016 on ‘Internet of Process Centric Design and Manufacture’.

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**Title---**Revolution in Manufacturing through Additive Manufacturing and Industry 4.0

**Abstract---**Additive Manufacturing (AM), also referred to as 3D Printing, is a technology that produces three-dimensional parts, layer by layer from a material, be it polymer or metal based. AM offers the possibility to produce complex parts without the design constraints of traditional manufacturing processes. The parts generated through modern AM processes are devoid of deficiencies that traditional 3D printing processes were hampered with, like poor strength, durability and functionality. Present day AM processes produce parts that can not only be directly used by the industry, but also lead to faster production of customized parts, optimized and consolidated design strategies and improved performance of the products.

The relevance of AM in the present world is worth notable especially in the light of ever growing importance of trends like Internet of Things (IoT) and Industry 4.0. IoT enabled AM machines facilitate a very high degree of automation, traditionally unknown to manufacturing industry.

The talk discusses an overview of AM and Industry 4.0, their advantages, origin and their co-evolution into one of the most significant forces that drive the advancement of manufacturing industry and the world in general.

# SPEAKERS

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**Prof. Wirachman Wisnoe**  
**Universiti Teknologi MARA, Malaysia**

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Prof. Wirachman Wisnoe was born in Bandung, Indonesia in 1962. He is currently working as professor at the Faculty of Mechanical Engineering, Universiti Teknologi MARA (UiTM) Shah Alam, Malaysia. He obtained his degree from University Paul Sabatier, Toulouse, France. He then took his further studies in Aeronautical Engineering at ENSICA, Toulouse, France. Prof. Wirachman Wisnoe received his Doctor of Philosophy in Fluid Mechanics from ENSAE/Sup'Aero, Toulouse, France in 1993. After graduated, he worked at the Indonesian Aerospace Industry (PT. IPTN) as Head of Mission Systems Department. In the year 2005, he joined UiTM. His research is focused on the aerodynamics of Blended-Wing-Body UAV and also in the area of thermofluids.

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**Title---** Blended Wing Body Aircraft: Progress and Challenges

**Abstract---** Blended Wing Body (BWB) aircraft is a concept where fuselage is merged with wing and tail to become a single entity. The fuselage of BWB generates lift together with the wing thus increasing the effective lifting surface area. The streamlined shape between fuselage and wing intersections reduces interference drag, reduces wetted surface area that decreases friction drag. The slow transition of fuselage-to-wing thickness by careful design may suggest that more volume can be stored inside the BWB aircraft, hence, increases payload and fuel capacity. The BWB concept aims at combining the advantages of a flying wing with the loading capabilities of a conventional airliner by creating a wide body in the center of the wing to allow space for passengers and cargo. For very large transport aircraft, the BWB concept is often claimed to be superior compared to conventional configurations in terms of higher lift-to-drag ratio and consequently less fuel consumption. However, despite all these benefits, the development of BWB for commercial air transport still faces many challenges. Amongst challenges that arise, some issues will be presented and discussed in this presentation. Even though the BWB can produce a high lift-to-drag ratio, it also creates high induced drag that reduces its optimum lift coefficient which is lower than the conventional aircraft. Another issue is in the control and stability. BWB aircraft requires multiple moving control surfaces to provide sufficient control force for longitudinal and lateral control. Cabin pressurization is also an issue to be addressed where the aircraft resists non-linear stresses that can produce severe deformations, compared to the uniform stretching stress that occurs in the cylindrical pressure vessels used in conventional aircraft.


# SESSIONS

**November 11th, 2018**

## **Invited Speech & Session I**

**[Mechanical Design Manufacturing and  
Automation]**

 **13:30-17:00**

 **Room 301, 3rd Floor**

**@No.2 Teaching Building, West Area of the campus**

西区教二楼 301 会议室

Chaired by Assoc. Prof. Hongjun Li,

Zhejiang Sci-Tech University, China

**[Invited Speech] By Prof. Wirachman Wisnoe, Universiti**

**Teknologi MARA, Malaysia**

**11 presentations—**

ME3004, ME3005, ME031, ME003, ME2001, ME2006, ME2-1005, ME3009, ME2-002,

ME030, ME008

**\*Note:**

Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.

Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.

One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.

# SESSIONS

<p><b>Invited Speech</b> <b>13:30-14:00</b></p>	<p>Blended Wing Body Aircraft: Progress and Challenges <b>Prof. Wirachman Wisnoe</b> Universiti Teknologi MARA, Malaysia</p> <p><b>Abstract.</b> Blended Wing Body (BWB) aircraft is a concept where fuselage is merged with wing and tail to become a single entity. The fuselage of BWB generates lift together with the wing thus increasing the effective lifting surface area. The streamlined shape between fuselage and wing intersections reduces interference drag, reduces wetted surface area that decreases friction drag. The slow transition of fuselage-to-wing thickness by careful design may suggest that more volume can be stored inside the BWB aircraft, hence, increases payload and fuel capacity. The BWB concept aims at combining the advantages of a flying wing with the loading capabilities of a conventional airliner by creating a wide body in the center of the wing to allow space for passengers and cargo. For very large transport aircraft, the BWB concept is often claimed to be superior compared to conventional configurations in terms of higher lift-to-drag ratio and consequently less fuel consumption. However, despite all these benefits, the development of BWB for commercial air transport still faces many challenges. Amongst challenges that arise, some issues will be presented and discussed in this presentation. Even though the BWB can produce a high lift-to-drag ratio, it also creates high induced drag that reduces its optimum lift coefficient which is lower than the conventional aircraft. Another issue is in the control and stability. BWB aircraft requires multiple moving control surfaces to provide sufficient control force for longitudinal and lateral control. Cabin pressurization is also an issue to be addressed where the aircraft resists non-linear stresses that can produce severe deformations, compared to the uniform stretching stress that occurs in the cylindrical pressure vessels used in conventional aircraft.</p>
<p align="center"><b>Session I—Mechanical Design Manufacturing and Automation</b> <b>[ Part 1 ] 7 Presentations—ME3004, ME3005, ME031, ME003, ME2001, ME2006, ME2-1005</b></p>	
<p><b>ME3004</b> <b>14:00-14:15</b></p>	<p>Analysis and Verification on Mechanics Mechanism for Flat Digging of Grab <b>Chang Xu, Hanbin Xiao, Sheng Zou and Feng Zhu</b> Wuhan University of Technology, China</p> <p><b>Abstract.</b> The research on digging resistances is the key to designing the grab, improving the grab's structure and realizing the automatic flat digging of grab dredger. This article focuses on the mechanical analysis and experimental research of grab's flat digging combining with theoretical calculation and experiments in dredging process. The theoretical digging resistances in both horizontal and vertical directions have been investigated in mathematical model. With the help of flat digging experiments, the forces on hoist rope and closing rope have been recorded. Then, work out the horizontal and vertical digging resistances based on moment balance. Since a good agreement is achieved between the theoretical calculations with the corresponding independent experimental results, the research has been verified and provides technical support for flat digging in dredging process.</p>

# SESSIONS

<b>ME3005</b> <b>14:15-14:30</b>	<p>Design of Small Lawn Garbage Sweeper  <b>Chao-ying Meng</b> and Ya-dong Sheng  Wenhua College, China</p> <p><b>Abstract.</b> In view of the fact that the leaves and white garbage in the lawns are difficult to clean, this paper designed a small lawn garbage sweeper. The motor drives the cleaning roller and the traveling mechanism to realize the automatic cleaning and recycling of garbage. The author designed a filter compartment and a compacting mechanism in the recycling bin to complete the preliminary screening of the garbage. Finally, the static analysis of the rear axle was carried out by ANSYS software, showing that the axle can meet its stiffness requirements.</p>
<b>ME031</b> <b>14:30-14:45</b>	<p>Failure Analysis and Experimental Research on the Structure of Key Parts of Safety Valves  Ye Dai, <b>Huibing Zhang</b>, Hanbo Zhang, Wenqiang Wei and Rui Liu  Harbin University of Science and Technology, China</p> <p><b>Abstract.</b> calculations and ANSYS analysis, stress analysis is performed on the key components of the new nuclear A48 safety valve under open and closed conditions to detect whether the safety valve fails. The natural frequency of the safety valve and the spring are respectively analyzed and tested for seismic performance. The spring parameters are calculated through spring design specifications to determine the method of spring failure calculation and analysis. A lateral deflection measurement bench was built to verify the correctness of the design method through experimental data and provide a reliable theoretical basis for the design of safety valves with high safety factors.</p>
<b>ME003</b> <b>14:45-15:00</b>	<p>Assessment of DBA-L Pressure Vessel Design Method by a Cylindrical Vessel with Hemispherical Ends  Xincheng Ren, <b>Hongjun Li</b> and Xun Huang  Zhejiang Sci-Tech University, China</p> <p><b>Abstract.</b> Stress categorization is an essential procedure in Design by Analysis (DBA) pressure vessel design methods based on elastic analysis in ASME and EN code. It was difficult to implement especially around structural discontinuities. A new elastic analysis, DBA-L, was proposed recently to avoid stress categorization. A model of the cylindrical pressure vessel with spherical end is used to check the validity of this method by comparing with other design methods based on stress categorization procedures and elastic-plastic stress analysis from ASME and EN code. The results indicate that the DBA-L is an economic and explicit method, and can be used an alternative method to stress categorization.</p>
<b>ME2001</b> <b>15:00-15:15</b>	<p>Experimental Study on the Valve Gap in the Gasoline Engine  <b>Fan Dong</b>, Chong Lei, XiaoYu Yang, ShaoFeng Wang and Cong Ruan  Dongfeng Motor Corporation Technical Center, China</p> <p><b>Abstract.</b> The influences of the installations of the camshaft support, and timing</p>

# SESSIONS

	<p>system and the heat release on the valve gap of the gasoline engine were analyzed in the present. The experiments were carried out on 50 4-cylinder 4-stroke gasoline engines, and the results indicate that to tighten the camshaft support has a great impact on valve gap, the indicated mean there was an obvious deformation in cylinder head after the camshaft support was tightened. The timing system also has a significant influence on the valve gap because it produces a downward force to the camshaft, leading to a smaller valve gap near the timing system and a bigger valve gap on the other side. It was also found that with the increase of temperature the valve gap was 0.1mm larger than that in the normal state.</p>
<p><b>ME2006</b> <b>15:15-15:30</b></p>	<p>Hydraulic Simulation Analysis of Sonic Drilling Hydraulic Vibration Head  <b>Shan Fan</b> and Zeping Chen  Wenhua College, China  Chongqing Research Institute of China Coal Technology and Engineering Group, China</p> <p><b>Abstract.</b> The hydraulic vibration head is the core component of sonic drilling rig, and the performance of its hydraulic system influences the technology of sonic drilling directly. The structure and hydraulic system of the hydraulic vibration head are designed, and the AMESim model of the hydraulic system is established in the paper. The hydraulic vibration system is simulated and analyzed to find out the influence rule of vibration frequency on the system performance. The results show that the larger the vibration frequency <math>f</math> is, the smaller the amplitude <math>H</math> is, and the displacement response of the vibrating piston approximates the sine curve. The velocity and acceleration of the vibrating piston accordingly increased, and the exciting force <math>F</math> of the vibrating piston increased significantly.</p>
<p><b>ME2-1005</b> <b>15:30-15:45</b></p>	<p>Study on Control of Corner Cracks in Cast Slabs and Its Application to Designing of Continuous Slab Casters of Baosteel Zhanjiang  <b>Ding Xiaolin</b>, Feng Changbao, Liu Qiang, Yan Jianwu, Luo Gaoqiang and Zhu Xiaoyong  CISDI Engineering Co., Ltd, China</p> <p><b>Abstract.</b> Corner cracks are very likely to occur in the slabs when peritectic steels, medium carbon steels, boron or niobium micro-alloyed steels are being produced by continuous slab caster, which will lead to edge upwarping and edge cracking of the finished products in the rolling process. To stop the slabs with corner cracks from going down to the rolling mills and affecting the finished rolled product quality, the slabs must be flame scarfed in the continuous casting process, thus causing increases in the operational cost. In 2013, Baosteel decided to relocate the two single-strand 2,300mm slab casters from Luojing of Shanghai to Zhanjiang of Guangdong. The slabs produced by the slab casters at Baosteel Luojing were observed with serious corner crack problem. To solve the problem of corner cracks, CISDI worked hard together with Baosteel to extensively optimize and improve the bender roller arrangement, segment roller gap accuracy control, secondary cooling zoning, secondary cooling width control, dynamic cooling control model, dynamic soft reduction model, etc., and eventually the conundrum of corner cracks which were frequent in the slab casters</p>

# SESSIONS

	when at Luoqing was solved and the presence of corner cracks in slabs of peritectic steels, medium carbon steels, boron or niobium micro-alloyed steels has been decreased from over 90% to less than 1%. The present article focuses on the work done specifically on solving the problem of corner cracks in the designing stage.
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## Coffee Break <15:45-16:00>

<b>Session I—Mechanical Design Manufacturing and Automation</b> <b>[ Part 2 ] 4 Presentations—ME3009, ME2-002, ME030, ME008</b>	
<b>ME3009</b> <b>16:00-16:15</b>	<p>Investigation of the Effect of Rotation Speed on Vibration Responses of Transmission System</p> <p><b>Xiaogang Liu</b>, Zhaoyu Wu, Jie Lu and Jinli Xu Wuhan University of Technology, China</p> <p><b>Abstract.</b> In the operating process, it is found the vibration of main reducer reaches a maximum value when the automobile is running at a speed around 4000 RPM. However, how the rotation speed of engine affects the vibration responses to automobile transmission system has not been investigated theoretically in details. To investigate this problem, the transmission system of automobile is simplified to a drive-final shaft system in this research. Based on lumped mass method, a coupled vibration model of drive-final shaft system is developed. This model is used to simulate the vibration response to transmission system at different rotation speed of engine. Simulation results show that the rotation speed has an evident effect on the vibration response to transmission system. In particular, when the rotation speed is 4000 RPM and 4200 RPM, the vibration amplitudes of pinion reach the maximum value. Moreover, finite element analysis is conducted to investigate the reason for this phenomenon. It is found that the vibration amplitude reaches the maximum value when the excitation frequency of engine is close to the resonance frequency of drive shaft. This research provides some reference for analyzing the vibration characteristics of automobile transmission system.</p>
<b>ME2-002</b> <b>16:15-16:30</b>	<p>Correlations between Milling Conditions and <math>B_2O_3</math> Activity of Mechanically Activated Boron Concentrate</p> <p><b>Yingzhe Xu</b>, Tao Jiang, Huiyang Gao and Xiangxin Xue Northeastern University, China</p> <p><b>Abstract.</b> Facing the current inefficiency of boron extraction from boron concentrate, this paper used mechanical activation as a pretreatment method to improve the extraction of <math>B_2O_3</math> from boron concentrate, and researched the influences of milling conditions, including the ball-sample mass ratio, the diameter of milling ball, and filling ratio of chamber, on the <math>B_2O_3</math> activity. The changes in the properties of the milled products were investigated to analyze the mechanism of activation. These</p>

# SESSIONS

	<p>three milling conditions all affected the <math>B_2O_3</math> activity more or less, as evidenced by the changes of <math>B_2O_3</math> activity with these milling factors. Under optimized milling conditions, the <math>B_2O_3</math> activity could be enhanced from 67.52% of the non-activated boron concentrate to 85.01%. The results also showed that the specific surface area increased and the crystal structure was damaged, which accelerated the reaction between the alkaline leaching solution and boron concentrate samples and enhanced the <math>B_2O_3</math> activity of the samples.</p>
<p><b>ME030</b> <b>16:30-16:45</b></p>	<p>Review on the Evaluation of Casing Damage Level in Oil and Gas Field  <b>Fangcheng Zhou</b>, Tao Wang, Changqing Ma, Pengfei Lei, Xinyi Zhang and Qingxin Ding  China University of Petroleum (Beijing), China</p> <p><b>Abstract.</b> The casing damage is a common problem encountered in the oil and gas field, and the casing damage will cause huge losses to the economic benefits of the oil and gas field. Grading the damage degree of the casing damage well can provide theoretical support for the oilfield workover operation and save the cost of workover. The casing damage classification has a strong guiding significance for the economic evaluation of the casing damage repair and the development of appropriate workover technology. After a review research on domestic and foreigner papers on the study of casing damage classification, it can be found that there is no mature theory and method for casing damage classification. After analyzing the entire workover process, the concept of the damage repair evaluation expert system is proposed to complete the entire workover process, evaluate the cost, and help the oil and gas field to obtain the best benefits.</p>
<p><b>ME008</b> <b>16:45-17:00</b></p>	<p>CFD Analysis and Geometry Optimization of the Wet Steam Multiphase Flow Cyclone Separator  <b>Julian Magno</b> and Jaime Honra  Mapua Institute of Technology, Philippines</p> <p><b>Abstract.</b> Cyclone separator is widely used in manufacturing plant, and power generation system as it removes particulates from air, gas, or liquid stream. In a power generating plant utilizing steam as working fluid, wet steam separator is an important component as it enables the separation of liquid from the mixture. Utilizing separator will inhibit corrosion, scale deposition from the turbine blades, and thus prevent turbine damage. The product of separation process is a dry steam that is supplied to the turbine and generates power.</p> <p>The researcher designs a cyclone separator that removes water particles from water-vapor mixture with the help of computer-aided software such as Creo and ANSYS Fluent. Rotational and gravitational effects are used to separate liquid particles from a gaseous stream.</p> <p>The main objectives of the research study comprised of the design of a water-vapor cyclone separator; creation of a geometry model of the cyclone separator using Creo, evaluation of the flow pattern, and simulation the fluid flow inside the tank using Computational Fluid Dynamics software. The aim of the research is to design a wet</p>

# SESSIONS

	<p>steam cyclone separator that will produce optimum separation efficiency and low pressure drop between dry steam outlet and steam inlet mixture.</p> <p>Results in the simulation were evaluated for further improvement, adjustments, and recommendation. The research will try to evaluate optimum geometry size in attaining maximum collection efficiency of the cyclone separator with minimum pressure drop as possible. The simulation were evaluated through mathematical and thermodynamic computation and through previous actual experiment conducted by the researcher.</p> <p>The expected output from this research are to determine the effective measurement of cyclone separator geometry that will provide the higher separation of the saturated liquid content from water vapor, and to minimize the pressure difference between the entry point of the water vapor and the exit point where dry steam leave.</p>
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# SESSIONS

**November 11th, 2018**

## **Session II**

**[Modern Electronic System & Measurement and  
Control Technology]**

 **17:00-19:15**

 **Room 301, 3rd Floor**

**@ No.2 Teaching Building, West Area of the campus**

西区教二楼 301 会议室

Chaired by Assoc. Prof. Liu Xiaogang,  
Wuhan University of Technology, China

**9 presentations—**

ME005, ME018, ME019, ME026, ME3001, ME033, ME035, ME036, ME012

**\*Note:**

Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.

Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.

One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.

# SESSIONS

<p><b>ME005</b> <b>17:00-17:15</b></p>	<p>Gray Assessment of Equipment Maintenance Support Capability Based On The Structure Entropy Weight Method  <b>Tao Huang</b>, Jiaqi Xiang and Hongmin Yu            Academy of Military Transportation, China            Academy of Equipment, China</p> <p><b>Abstract.</b> The influencing factors which about equipment maintenance support abilities are analysed and the index system that is used to evaluate equipment support abilities are constructed in the paper. Then, the weight of the index is determined by the structure entropy weight method which is a combination of qualitative and quantitative. The comprehensive evaluation model of equipment maintenance support abilities are constructed by combining gray clustering evaluation theory. Finally, the feasibility and validity of the model are verified by an example.</p>
<p><b>ME018</b> <b>17:15-17:30</b></p>	<p>Design of Temperature Fluctuation Test Platform Based on Radiation Heat Transfer  <b>Xiao Han</b>, Ying Zhou, Ruijin Jia and Zijuan Wang            Beihang University, China            Beijing Institute of Spacecraft Environment Engineering, China</p> <p><b>Abstract.</b> The optical characteristics of the space science detectors are very sensitive to the temperature fluctuation. In order to study the effect of it, a method to simulate the temperature fluctuation was put forward in this paper, and the feasibility of this method was verified numerically. A radiation disturbance was artificially applied at a certain distance from the test platform, so that the surface temperature of the platform changed periodically with the radiation heater. The results show that the radiation heat transfer disturbance could produce a temperature fluctuation on the test platform, which provides a reliable theoretical support for the time-varying temperature control system.</p>
<p><b>ME019</b> <b>17:30-17:45</b></p>	<p>Numerical Study of the Thermal Model on High Uniformity Temperature Test Platform  <b>Zijuan Wang</b>, Ying Zhou, Xiao Han and Jingyi Shao            Beijing Institute of Spacecraft Environment Engineering, China</p> <p><b>Abstract.</b> The surface temperature uniformity of a test platform with an effective test area of 600 mm × 600mm was numerically studied. The conductive heat transfer model for the test platform and the device under test (DUT) installed on the surface was established in the present work, as well as the radiative heat transfer model from the platform surface to the background temperature. The platform surface was divided into 5 or 9 regions where heated independently to make the surface temperature consistent. The temperature uniformities of these two partition designs were compared. The result shows that the 9 regions design has higher temperature uniformity at both target temperatures of -10℃ and +45℃.</p>
<p><b>ME026</b> <b>17:45-18:00</b></p>	<p>Thermal Error Measurement and Analysis of Vertical Machining Center  <b>Yumeng Ma</b>, Huanyong Cui, Changchun Li, Changzhong Wu and Zhenyuan Zhao            University of Jinan, China</p>

# SESSIONS

	<p><b>Abstract.</b> In this paper, the thermal calculation and thermal-structural coupling analysis of the vertical machining center are carried out to obtain the theoretical values of thermal generation and thermal displacement. Combined with the thermal structure analysis of vertical machining center, sensors are placed at the key positions with large thermal displacement to measure and analyze the thermal error data, and the law of temperature and thermal deformation of machining center is found out. This research provides theoretical basis for thermal error compensation.</p>
<p><b>ME3001</b> <b>18:00-18:15</b></p>	<p>Corneal Biomechanical Properties Characterization Using Air-jet Indentation Based Optical Coherence Tomography System (AIOCT) Li-ke Wang, Jia-ying Zhang, Tian-jie Li, <b>Xue-yong Zhang</b>, Lei Tian and Yong-ping Zheng Anhui Jianzhu University, China</p> <p><b>Abstract.</b> We proposed a novel method together with system to quantify the corneal biomechanics. The objectives of this study are to develop a method to measure the corneal biomechanical properties in vivo and to evaluate the performance of AIOCT system. A novel AIOCT system was established and a mathematical model was built on the basis of the current air-jet indentation method. Experiments were performed to evaluate the mechanical properties of eleven custom-made silicone corneal mimicking phantoms by the AIOCT system under different intraocular pressures (IOP). The results were then compared with those measured by the standard mechanical tensile test and indentation test. The phantom's moduli were ranged from 0.08 to 1.03 MPa according to the tensile and indentation test. The elastic moduli of corneal silicone phantoms (Eairjet) were measured using the AIOCT system with the proposed mathematical model at four IOPs (0.6, 15.3, 29.8, and 44.7 mmHg). The Eairjet were agreed well with the corresponding moduli (E<sub>tensile</sub>) measured by the tensile test (Eairjet = 1.188 E<sub>tensile</sub>, R<sup>2</sup> = 0.925). The preliminary results showed that this technique was capable of measuring corneal biomechanical properties in vivo and it may provide a clinical potential non-invasive and non-contact means to the diagnosis of keratoconus suspects in the future.</p>
<p><b>ME033</b> <b>18:15-18:30</b></p>	<p>Deployment Kinematic Analysis and Control of a New Hoop Truss Deployable Antenna <b>Zihan Sun</b>, Yankang Ding, Yiqun Zhang and Dongwu Yang Xidian University, China</p> <p><b>Abstract.</b> Firstly, based on the structural characteristics of a new type of hoop truss deployable antenna, this paper derives the motion transformation relation between two hoop modules by using the method of coordinate transformation, and establishes the general model for deployment kinematic analysis, which can be applied to analyze the position, velocity and acceleration of any point on the structure. Secondly, according to the relation between the driving cable and the hoop module, the motion planning of the hoop module is transformed into the motion control of the driving cable, which can realize the deploying position control of the antenna. Finally, numerical simulations show the control method can make the antenna smoothly</p>

# SESSIONS

	deploy following the specified deployable motion.
<b>ME035</b> <b>18:30-18:45</b>	<p>Shape Design of Cable-net for Parabolic Cylindrical Deployable Antenna  <b>Han Zhang</b>, Bo Dong and Yiqun Zhang  Xidian University, China</p> <p><b>Abstract.</b> A method of cable-net shape design based on the equilibrium matrix method is proposed for a new parabolic cylindrical deployable antenna structure with fewer modules. And the inverse iteration method is adopted to find the shape of cable-truss structure with considering the truss deformation induced by cable tension. Firstly, the ideal geometrical configuration of the locally symmetric support cable is designed for the given truss. Then, the pretension distribution of the cable is solved by the equilibrium matrix method under the circumstance of the unchanged topology of cable-net structure, position of nodes and boundary condition. In addition, the inverse iteration method is adopted to find the shape of cable-truss structure. Finally, the validity of the method is verified by simulation analysis.</p>
<b>ME036</b> <b>18:45-19:00</b>	<p>Geometry Modeling of Truss Structure for a Space Deployable Parabolic Cylindrical Antenna  <b>Bo Dong</b>, Han Zhang and Yiqun Zhang  Xidian University, China</p> <p><b>Abstract.</b> To meet the requirements for larger aperture and high storage rate deployable antenna in the space missions, a geometry modeling design scheme for parabolic cylindrical antenna was proposed based on module connection. The scheme raised in this paper realized geometry modeling for different aperture of antenna utilizing several kinds of modules. According to the shape feature of mesh surface of the parabolic cylindrical antenna, the schematic design for module division was carried out in the parabolic direction and baseline. The number of modules and the size of links were calculated meanwhile. The validity of the scheme was proved by numerical analysis for the deployable process.</p>
<b>ME012</b> <b>19:00-19:15</b>	<p>Sparse Pose Graph Decomposition and Optimization for SLAM  <b>Tian Liu</b>, Yongfu Chen, Zhiyong Jin, Kai Li, Zhenting Wang and Jiongzhi Zheng  Huazhong University of Science &amp; Technology, China</p> <p><b>Abstract.</b> The graph optimization has become the mainstream technology to solve the problems of SLAM (simultaneous localization and mapping). The pose graph in the graph based SLAM is consisted with a series of nodes and edges that connect the adjacent or related poses. With the widespread use of mobile robots, the scale of pose graph has rapidly increased. Therefore, optimizing a large-scale pose graph is the bottleneck of application of graph based SLAM. In this paper, we propose an optimization method basing on the decomposition of pose graph, of which we have noticed the sparsity. With the extraction of the Single-chain and the Parallel-chain, the pose graph is decomposed into many small subgraphs. Compared with directly processing the original graph, the speed of calculation is accelerated by separately optimizing the subgraph, which is because the computational complexity is increasing</p>

# SESSIONS

	<p>exponentially with the increase of the graph's scale. This method we proposed is very suitable for the current multi-threaded framework adopted in the mainstream SLAM, which separately calculate the subgraph decomposed by our method, rather than the original optimization requiring a large block of time in once may cause CPU obstruction. At the end of the paper, our algorithm is validated with the open source dataset of the mobile robot, of which the result illustrates our algorithm can reduce the one-time resource consumption and the time consumption of the calculation with the same map-constructing accuracy.</p>
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<19:15-20:30>


**Dinner @ 中国地质大学震旦园**


# SESSIONS

**November 11th, 2018**

## **Session III**

**[Electronic Power and Intelligent Control]**

 **13:30-15:45**

 **Room 314, 3rd Floor**

**@ No.2 Teaching Building, West Area of the campus**

西区教二楼 314 会议室

Chaired by Prof. Yu-Chi Wu,

National United University, Taiwan

**9 presentations—**

ME1004, ME002, ME041, ME021, ME034, ME007, ME017, ME2-1002, ME032

**\*Note:**

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One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.

# SESSIONS

<p><b>ME1004</b> <b>13:30-13:45</b></p>	<p>Current Decoupling and Controller Design for Induction Motors Based on Neutral Delay System Guofang Wang, <b>Yuedou Pan</b> and Yongliang Li University of Science and Technology Beijing, China</p> <p><b>Abstract.</b> In the AC power transmission system, in order to reduce the loss of switching devices, the switching frequency of the traction converter is generally low, and a large digital control delay will occur, which will aggravate the cross coupling between the excitation component and the torque component of the stator current of the motor, resulting in poor system performance. In order to solve this problem, based on the theory of neutral time-delay system and the rotor flux-oriented model of induction motors, the mathematical model of neutral-type time-delay system for induction motors is established, and a neutral current controller with current decoupling control is designed. The decoupling control of the stator current reduces the influence of the digital control delay on the system performance. The simulation results show that the induction motor system with a neutral current controller has the advantages of small coupling, rapid response, and strong robustness. Explains the feasibility of the designed current controller.</p>
<p><b>ME002</b> <b>13:45-14:00</b></p>	<p>Dynamic Finite Element Model Updating for On-load Tap Changer based on Super-model Zhiyuan Liu, Hongseng Zou, <b>Hui Miao</b>, Dapeng Chen and Lin Guo College of Energy and Power Engineering, Nanjing University of Aeronautics and Astronautics, China</p> <p><b>Abstract.</b> A method is presented for dynamic model updating of on-load tap changer (OLTC). Based on a sensitivity-based optimization method, the initial simplified finite element (FE) model of OLTC component is updated using the analytical results of the FE super-model. The objective of model updating is to reduce the frequency difference between the simplified FE model and the super-model, and to make the simplified model accurately represent dynamic characteristics of the super-model. The updated simplified models can be further used in the modeling and analysis of the whole OLTC model. The results, taking the base of OLTC as example, indicate that the dynamic behavior of the updated simplified model match well with that of the super-model. Subsequently, the dynamic behavior of OLTC assembled with the updated parts is further predicted by modal analysis. The presented method improves the calculation efficiency, as well as accuracy, which has broad application prospects for dynamic prediction of complex structures in engineering.</p>
<p><b>ME041</b> <b>14:00-14:15</b></p>	<p>Islanding Detection Using RT-Lab <b>Yu-Chi Wu</b>, Jiajun Lin, Jun-Han Chen and Ming-Yu Hsieh National United University, Taiwan</p> <p><b>Abstract.</b> As renewable energy is widely used, distributed power generation systems are also used in wide range. However, some problems in renewable power systems have to be addressed. Among these problems, the islanding operation has the most</p>

# SESSIONS

	<p>important impact to the safety of utility workers and the service lives of equipment. This paper studies islanding detection for a microgrid system with unbalanced loads and its implementation on a real-time simulator (RT-Lab) to accelerate simulations. The presented islanding detection approach utilizes rate of change of frequency (ROCOF), under/over frequency, and negative sequence current injection methods. Decoupled double synchronous reference frame software phase lock loop (DDSRF-SPLL) is used to synchronize the grid-connected power converter with the utility voltages under unbalanced load conditions. Two cases are tested in real time. The presented approach detects the islanding in 0.09 seconds after the fault occurs, and the voltage at the point of common coupling (PCC) returns stable in 0.1 seconds after the fault occurs, satisfying the IEEE Standard 1547-2003.</p>
<p><b>ME021</b> <b>14:15-14:30</b></p>	<p>Design of Electric Linear Load Simulator based on LabVIEW+PXI  <b>Weidong Pan</b>, Yuanxun Fan, Jianjie Lei, Zhiwei Xu and Jian Tao  Nanjing University of Science and Technology, China</p> <p><b>Abstract.</b> In order to realize the hardware-in-the-loop (HIL) experiments of a certain type of electric linear actuator in the laboratory, an electric linear load simulator (ELLS) based on LabVIEW+PXI platform was developed to simulate the external force of the actuator under actual working conditions. In structural design, the ball screw is used to convert the PMSM torque into linear force. In hardware design, the system is built using the upper-lower computer system architecture based on PXI bus. In software design, the program is written in LabVIEW, which mainly includes the data processing and display program in the upper computer and the data acquisition program, the loading motor control program and the actuator control program in the lower computer (PXI), in order to ensure the loading accuracy of ELLS, control methods such as force closed-loop PID controller, position feedforward compensation and input feedforward compensation are also introduced in the loading motor program. Finally, the ELLS was built and the signal tracking tests were carried out. The experimental results shows that the loading accuracy can reach 93.5% and 90.3% when ELLS tracks 1000N-2Hz and 1000N-5Hz respectively, which proved that the accuracy of ELLS satisfies the “Double Ten Index”.</p>
<p><b>ME034</b> <b>14:30-14:45</b></p>	<p>A Cable-net Form-finding Process for an Up-down Asymmetric Rim Truss  <b>Yankang Ding</b>, Zihan Sun, Dongwu Yang and Yiqun Zhang  Xidian University, China</p> <p><b>Abstract.</b> Traditional AstroMesh cable-net reflectors were deployed via a parallelogram mechanism, which provides symmetric supporting points for the front and rear nets and determines the height of stowed rim truss. In order to further reduce the height of stowed rim truss, a new up-down asymmetric rim truss was proposed without matched cable-net form-finding approach. This paper aims at designing a matched cable-net form-finding process for the new structure.</p>

# SESSIONS

<p><b>ME007</b> <b>14:45-15:00</b></p>	<p>Slip Ratio Control For Four Wheels Independent Driven Electric Car <b>Zhang Lun</b>, Wang Rongrong and Chen Nan Southeast University, China</p> <p><b>Abstract.</b> Detecting vehicle velocity is necessary in order to detect slip ratio in slip ratio control system, however, it is very difficult to measure the vehicle velocity directly. The paper has proposed a method to estimate and control slip ratio without detecting the vehicle velocity, which is based on extended state observer. The vehicle motion is stable with the slip ratio control. The paper verified the effectiveness of the proposed algorithm by the simulation.</p>
<p><b>ME017</b> <b>15:00-15:15</b></p>	<p>Numerical Study on Heat Transfer of Gaseous Nitrogen Thermoregulation System in Thermal Vacuum Chamber <b>Ying Zhou</b>, Chao He, Bing Bai and Juan Ning Beijing Institute of Spacecraft Environment Engineering, China</p> <p><b>Abstract.</b> Extensive numerical study on the heat transfer performance of the gaseous nitrogen (GN) thermoregulation shroud surface was conducted in this work. The average heat transfer coefficient was investigated under different shroud length and nitrogen parameters (such as velocity, temperature and mass flow rate). The result shows that the heat transfer performance is affected less by shroud length but largely by mass flow rate. When the mass flow rate is constant, the inlet temperature increases heat transfer coefficient. Finally, dimensionless correlation of the average Nusselt number over shroud surface with Reynolds number and Prandtl number was obtained.</p>
<p><b>ME2-1002</b> <b>15:15-15:30</b></p>	<p>A Study on Development of Seam Tracking Algorithm in Robotic GMA Welding Process <b>Gang Zhang</b>, Tae-Jong Yun, Won-Bin Oh, Bo-Ram Lee and Ill-Soo Kim Mokpo National University, South Korea</p> <p><b>Abstract.</b> In weld seam tracking system, image processing plays an important role in obtaining accurate weld information. Due to the large number of noise signals in the weld image, the surface condition of the weldment and the illumination environment also have a great influence on the image processing results.</p> <p>This paper develops an image pre-processing algorithm that based on thermal high-speed camera, which mainly includes image noise removal algorithm and contrast enhancement algorithm. In the noise removal algorithms, three kinds of noise filtering (minimum filtering, median filtering and maximum filtering) were employed. In addition, four morphological operators (erosion, dilation, opening and closing operation) were utilized in the image contrast enhancement processing. The proposed algorithms are validated and compared to obtain an optimal algorithm for each image processing step. The simulated results show that the median filtering algorithm and the closing operation are the preferred methods because these algorithms provide lower RMSE (Root Mean Square Error) and higher PSNR (Peak Signal-to-Noise Ratio). Therefore, median filtering was applied to reduce the noise of the seam image, and closing operation was used for image contrast enhancement. Finally, the threshold is</p>

# SESSIONS

	obtained to binarize the image to obtain a better enhancement effect based on the Otsu's method.
<b>ME032</b> <b>15:30-15:45</b>	<p>Design and Implementation of Admittance Control for a Dual-Arm Robot under Space Limitation</p> <p><b>Jinxing Yang</b>, Yinhui Xie, Mingqi Feng and Jun Li          Quanzhou Institute of Equipment Manufacturing, Chinese Academy of Sciences, China</p> <p><b>Abstract.</b> Aimed at the situation lack of suitable industrial robots with speed requirement and space limitation, a novel simple structured and high speed dual-arm robot is designed. The robot control system has been achieved by using high speed controller, real-time bus EtherCAT and integrating the sensor system via Ethernet interface. Kinematic and dynamic analysis are the basis of its kinematic control and trajectory planning. This paper presents a force-free control method for direct teaching of the robot and adopts a Cartesian admittance control algorithm to realize human-machine interaction. The admittance control is conducted by utilizing six-dimensional force/torque sensor fixed to the end-effector of manipulator. To evaluate the performance of the proposed controller and control algorithm, a point-to-point teaching task is conducted.</p>



**Coffee Break**  
**<15:45-16:00>**

# SESSIONS

**November 11th, 2018**

## **Session IV**

[Engineering Material Design and Analysis]

🕒 **16:00-18:30**

📍 **Room 301, 3rd Floor**

**@ No.2 Teaching Building, West Area of the campus**

西区教二楼 301 会议室

Chaired by Prof. Dao Hua Zhang

Nanyang Technological University, Singapore

**10 presentations—**

ME2-006, ME2-004, ME2-1004, ME2-2001, ME2-2003, ME2-2004, ME2-005, ME2-2002,  
ME2-007, ME2-008

**\*Note:**

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# SESSIONS

<p><b>ME2-006</b> <b>16:00-16:15</b></p>	<p>Plasmonic Materials and Applications <b>Dao Hua Zhang</b> Nanyang Technological University, Singapore</p> <p><b>Abstract.</b> Plasmonic metamaterials have attracted intensive attention for decades due to their novel properties and high potential for a wide range of applications. In this talk, I will share with you our recent work on surface plasmon resonator (SPR) arrays and their applications for optical sensing and enhanced emission. With the new electron-beam-lithography process we developed, we have demonstrated two- and three- dimensional SPR arrays with controllable electronic and magnetic resonances ranging from long wave infrared to near ultraviolet [1-2]. Their applications for biochemical sensing has been explored [3,4]. By integrating SPR arrays with InAsSb based heterojunction photodiode, strong enhancement in mid-wave infrared photodetection can be observed and a room temperature detectivity of <math>8 \times 10^9</math> Jones was demonstrated.</p>
<p><b>ME2-004</b> <b>16:15-16:30</b></p>	<p>A Study on Experimental Design Methods for the Automatic GMA Welding Process <b>Zong-Liang Liang</b>, Tae-Jong Yun, Won-Bin Oh, Bo-Ram Lee and Ill-Soo Kim Mokpo National University, South Korea</p> <p><b>Abstract.</b> Generally, the welding parameters directly affect the weld forming and the joint performance. Because many parameters are involved in the automatic arc welding process, it is not realistic to use traditional experimental methods, such as full factorial design. Therefore, it is important to find out the good experimental design method to determine the welding parameters for optimal joint quality with a minimal number of experiments.</p> <p>Therefore, this study is aimed at investigating the effect of DOE (Design of Experiment) methods on bead width of mild steel parts welded by the automatic GAM (Gas Metal Arc) welding process. In this work, Taguchi method was used for studying the effect of the welding parameters on optimization of bead width, while Box-Behnken method was utilized to develop a mathematical model relating the bead width to welding parameters such as welding voltage, arc current, welding speed and CTWD (Contact Tip to Work Distance). The S/N (signal-to-noise) ratio and the ANOVA (Analysis of Variance) were employed to find the optimal bead width. Confirmation tests were carried out to validate the effectiveness of the Taguchi method. The experimental results show that welding current mainly affected the bead width. The predicted bead width of 3.12mm was in good agreement with the confirmation tests. With the regression coefficient analysis in the Box-Behnken design, a relationship between bead width and four significant welding parameters was obtained. A second-order model has also been established between the welding parameters and the bead width as welding quality. The developed model is adequate to navigate the design space.</p>
	<p>A Study on Lead Adsorption by the Hen Egg Shells from EnShi, HuBei Province, China Gong Heng-heng, <b>Li Tao</b>, Zhang Wen-ya and Liao Zhao-jiang</p>

# SESSIONS

<p><b>ME2-1004</b> <b>16:30-16:45</b></p>	<p>China Three Gorges University, China</p> <p><b>Abstract.</b> The hen egg shells (HES) from EnShi, HuBei Province, China, which contain selenium, are used as adsorbent for the adsorption of lead ion from its aqueous solutions. The selenium in the HES could help to remove lead from its aqueous solution. The HES had been found to be the more efficient in the experiment and removed about 95% of lead from its aqueous solution. The final concentration of lead ion was found lower than the waste water quality standards from the initial concentration of lead ion 100.0 mg/L through these two steps of adsorptions. One gram of the HES can adsorb nearly <math>31.71 \pm 0.040</math> mg of lead ions. The adsorption kinetics was fitted by first-order model throughout the period. The present adsorption process is spontaneous, indicating HES can be available used for the removal of lead ions from its aqueous solution.</p>
<p><b>ME2-2001</b> <b>16:45-17:00</b></p>	<p>The Influence of Technological Parameters on Drawing Force at Cold Drawing of Steel Tubes using FEM Simulation Mária Kapustová, <b>Róbert Sobota</b> and Martin Necpal Institute of Production Technologies, Slovakia</p> <p><b>Abstract.</b> The process of cold die drawing of tubes is ranked among frequently used methods of production of seamless tubes and is performed in drawing tool which is characterized by simple design. Shape and dimensions of the drawing tool depend on tube reduction degree, i. e. on original diameter of initial tube and final internal diameter of the tube. Tube wall thickness is not determined by any tool. The technology of cold die drawing of tubes is influenced by various process parameters, i.e. geometry of the die itself, strain degree and strain rate, force conditions, conditions of friction, method of lubrication and the type of used lubricant. The contribution is concerned with evaluation of influence of the selected process parameters using FEM simulation. Designed graphs illustrate the impact of coefficient of friction and reduction cone of drawing tool on the size of drawing force.</p>
<p><b>ME2-2003</b> <b>17:00-17:15</b></p>	<p>Thickness-Dependent Tensile Behavior of Cu-Mn Alloys under Different Dislocation Slip Modes <b>Le-Le Kang</b>, Dong Han and Xiao-Wu Li Northeastern University, China</p> <p><b>Abstract.</b> To explore the role of dislocation slip mode playing in the size effect of mechanical behavior of metallic materials, the tensile behavior of Cu-5at.%Mn and Cu-20at.%Mn alloys with thickness (t) spanning from 0.1 to 2.0 mm is investigated. The results reveal that the yield strength <math>\sigma_{YS}</math> of Cu-5at.%Mn alloy displays an independence of thickness, whereas the ultimate tensile strength <math>\sigma_{UTS}</math> and the uniform elongation <math>\delta</math> show an obvious size effect. The <math>\sigma_{UTS}</math> and <math>\delta</math> first slightly decrease as t is reduced from 2.0 to 0.5 mm, but evidently drop when t is below 0.5 mm. A similar size effect is also exhibited in Cu-20at.%Mn alloy; however, the variation trend of “the smaller the weaker” in size effect can be weakened by the planar slip of dislocations occurring during the deformation of this alloy.</p>

# SESSIONS

<p><b>ME2-2004</b> <b>17:15-17:30</b></p>	<p>Temperature-Dependent Plastic Deformation Behavior of Cu-Ni Alloys: Coupled Influence of Stacking Fault Energy and Short Range Clustering <b>Ying Wang</b>, Dong Han and Xiao-Wu Li Northeastern University, China</p> <p><b>Abstract.</b> The uniaxial tensile tests were conducted at different temperatures to explore the coupled influence of stacking fault energy (SFE) and short-range clustering (SRC) on the plastic deformation behavior of Cu-Ni alloys. The results demonstrate that the ultimate tensile strength and uniform elongation decrease with increasing temperature due to the competitive influence of SFE and SRC. Dynamic strain aging (DSA) effect is observed at 200 and 250°C, and such an effect becomes more notable with increasing Ni content. The occurrence of DSA effect is thought to be caused by pinning of moving dislocations by SRC and diffusing solute atoms. The plastic deformation mechanisms for Cu-Ni alloys is mainly governed by wavy slip of dislocations at different temperatures, since the SFE of Cu-Ni alloys are very high especially at high temperatures, and the effect of SRC can be nearly ignored.</p>
<p><b>ME2-005</b> <b>17:30-17:45</b></p>	<p>Chiral Cysteine Selective Transport of BSA by CdS Nanostructures Modified AAO Template <b>Xiande Yang</b>, Tinglan Wang and Yongqian Wang China University of Geosciences, China</p> <p><b>Abstract.</b> Protein transport is an important process of life and is strongly influenced by chiral interaction. And nanostructures had been widely used in biochemistry for their excellent properties. However, it is challenging to use nanotechnology to improve the sensitivity of biotechnology. Herein, we assembled CdS NPs in AAO channels based on the artificial biomimetic nanochannels and modified with cysteine enantiomers for BSA transport to study the improvement of sensitivity about nanostructures in nanochannels. The results show that decorating CdS NPs in AAO channels and modifying with chiral cysteine can improve the sensitivity of biological molecules response. This research presents a new application of nanotechnology in biotechnology and provides a further understanding of the improvement of sensitivity about nanostructures in biological molecules response.</p>
<p><b>ME2-2002</b> <b>17:45-18:00</b></p>	<p>Preparation of S-doped Amorphous TiO<sub>2</sub> and its Photocatalytic Activity under Visible Light <b>Yi Chuan</b>, Deng Wei, Cui Longzhe and Zhang Beiping Huazhong University of Science and Technology, China</p> <p><b>Abstract.</b> TiO<sub>2</sub> doped with S (S-TiO<sub>2</sub>) were prepared via modified sol-gel method and low temperature calcination method using thiourea as sulfur source. The resulting products were characterized by X-ray diffraction (XRD), Transmission electron microscope (TEM), X-ray photoelectron spectrometer (XPS), Fourier transform infrared (FTIR) and UV-vis diffuse reflection spectroscopy. The catalytic activity of S-TiO<sub>2</sub> under visible light (<math>\lambda &gt; 400\text{nm}</math>) was evaluated using methyl orange (MO) as target pollutant. The results showed that the prepared s-TiO<sub>2</sub> changed from</p>

# SESSIONS

	<p>amorphous state to anatase phase with the increase of calcining temperature from 300°C to 400°C. The product pre-pared under 300°C was amorphous TiO<sub>2</sub> because there was no characteristic diffraction peak of TiO<sub>2</sub> in its XRD spectrum, but clear diffraction peak of anatase TiO<sub>2</sub> appeared in the XRD spectrum of s-TiO<sub>2</sub> prepared under 350°C. Amorphous S-TiO<sub>2</sub> prepared under 300 °C presented a kind of sheet-like structure with irregular rough surface. Ti exists in S-TiO<sub>2</sub> with Ti<sup>4+</sup> and Ti<sup>3+</sup>, S exists in the oxidation state of S<sup>6+</sup> and S<sup>4+</sup> and replaces part of Ti in the TiO<sub>2</sub> lattice to form Ti-O-S structure, which reduces the band gap of TiO<sub>2</sub> and enhances its photocatalytic activity under visible light. The amount of S doping didn't affect the crystal shape of the product, but had a certain effect on the cat-alytic activity. The amorphous S-TiO<sub>2</sub> (300) catalyst with S content of 3% has great catalytic deg-radation effect on methyl orange. In the process of photocatalytic degradation of organic matter, photogenerated holes, superoxide radicals and hydroxyl radicals participate in the redox reaction together, and photogenerated holes play an important role in the degradation of organic matter.</p>
<p><b>ME2-007</b> <b>18:00-18:15</b></p>	<p>New method of brazing by applying thin film via powder magnetron sputtering for heat exchanger application  <b>Bushroa Binti Abd Razak</b>  University of Malaya, Malaysia</p> <p><b>Abstract.</b> Recent research addresses the issue of brazed exhaust gas recirculation coolers (EGRC) that requires a heat exchanger captures interest. The heat exchanger that was made up of stainless steels is increasingly important for this application. However, conventional method of brazing process whereby the binder mixture containing 70% binder and 30% mixture is a hindrance to ensure the pollutant free when the heat exchanger is in operation. This is due to the binder that may evaporate at peak temperature of the engine combustion and produce pollutant gaseous. Additionally, using Ni based filler metal that requires expensive manufacturing method seeking cheaper option for brazing process. Our preliminary experiments have brazed two plates of SUS304 that sandwiched with deposited porous Ni foam showed good intact between the plates. The results motivated us to explore more in preparing a thin layer of Ni based powders brazing filler metal as a replacement to Ni based foil form brazing filler metal by using powder magnetron sputtering. Thus, Ni based powders in which one containing boron, and the other one containing phosphorus were deposited on mating surface of SUS304 as well as on porous Ni foam. Low concentration of these impurities may improve wetting and lower down melting point of Ni down to around 1000 °C. Subsequently, the deposited plates were sandwiched with the deposited porous Ni foam, and preceded with brazing process. In other experiment, the deposited SUS304 plates using similar powders were also barely brazed for a reference purpose. Typical characterization and mechanical performance were compared, and sufficiently said that the method successfully brazed the plates at a lower pure Ni melting point. Thus this new method could provide an alternative to the conventional brazing technique of using brazing foil form</p>

# SESSIONS

	filler metal or powders with binders. The process is considered environmentally friendly and expected to offer lower cost.
<b>ME2-008</b> <b>18:15-18:30</b>	<p>Characteristics of intermetallic compound achieving to the sound joint during friction stir welding of CuZn30/Al1050</p> <p><b>A. Esmaeili</b>, A. M. S. Hammuda and C.Sbarufatti Qatar University,Qatar</p> <p><b>Abstract.</b> Throughout this study, joining of aluminum 1050 to CuZn30 was successfully probed. To examine the quality of the weldments, some experiments were conducted to probe characteristics of the sound joint. Moreover, SEM equipped with EDX and XRD were used to identify the intermetallic compounds formed in various areas. The result showed that formation of Intermetallic compounds is essential which was led to the appropriate weldment. Al<sub>2</sub>Cu, CuZn and Al<sub>4</sub>Cu<sub>9</sub> were the most important developed intermetallic compounds in the interface and within the stir zone. Likewise, majority of developed intermetallic compounds possessed common characteristics i.e. thinness, uniformity and continuity.</p>



<19:15-20:30>

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# POSTERS

ME001	<p>Defect Detection and Three Dimensional Reconstruction of Castings Jing Liu East China University of Science and Technology, China</p> <p><b>Abstract.</b> There are defects inevitably in the production of castings. These defects will short the life of castings. In this paper, defects of the castings are detected by industrial CT non-destructive testing method and a series of CT slice images are obtained. Then edge extraction is realized through the Canny operator and the defects in the castings are found. Finally, surfaces and its internal defects are reconstructed for the casting based on secondary development of Unigraphics software and Visual Studio 2013. Experiments show that internal defects of the castings can be extracted by the Canny operator effectively. Internal position and shape of defects can be observed directly by three dimensional reconstruction.</p>
ME020	<p>Development and Validation of an Occupant Biomechanical Model for the Aortic Injury Analysis under Side Impacts Zhengwei Ma, Lele Jing and Lianbo Jiang Shenzhen University, Shenzhen, China Shenzhen Technology University, China</p> <p><b>Abstract.</b> Traumatic rupture of the aorta (TRA) is one of the leading causes of death in side impacts. However, the injury mechanism of TRA is still not clear now. In this study, an occupant biomechanical model for the aortic injury study was presented. The anatomical structures and mechanical characteristics of the thoracic organs, especially the cardiac aortic system, were replicated as precise as possible. Through model validations against the Post Mortem Human Subjects (PMHS) tests, good agreements were achieved between them in terms of the aortic strain, stress and deflection responses and injury distributions. Moreover, it was found that the injury mechanisms of the aorta under pure left side impact and oblique left side impact were different. In pure left side impact, the peri-isthmic region and descending aorta presented higher risks of TRA. In oblique left side impact, the TRA risk in aortic boot was higher than in other regions. The biomechanical model presented in this study could be of use to both the injury mechanism study of TRA as well as the design of occupants' safety countermeasures involving aortic injuries in side impacts.</p>
ME022	<p>Implicit Euler Implementation of Twisting Controller and Super-Twisting Observer Without Numerical Chattering: Precise Quasi-Static MEMS Mirrors Control Dong Luo, Xiaogang Xiong, Shanhai Jin and Wei Chen Huazhong University of Science and Technology, China Harbin Institute of Technology, China Yanbian University, China Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China</p> <p><b>Abstract.</b> The quasi-static operations of MEMS mirror are very sensitive to undesired oscillations due to its very low damping. It has been shown that closed-loop control can be superior to reduce those oscillations than open-loop control in the literature.</p>

# POSTERS

	<p>For the closed-loop control, the conventional way of implementing sliding mode control (SMC) algorithm is forward Euler method, which results in numerical chattering in the control input and output. This paper proposes an implicit Euler implementation scheme of super twisting observer and twisting control for a commercial MEMS mirror actuated by an electrostatic staggered vertical comb (SVC) drive structure. The famous super-twisting algorithm is used as an observer and twisting SMC is used as a controller. Both are discretized by an implicit Euler integration method, and their implementation algorithms are provided. Simulations verify that, as compared to traditional sliding mode control implementation, the proposed scheme reduces the chattering both in trajectory tracking output and control input in presence of model uncertainties and external disturbances. The comparison demonstrates the potential applications of the proposed scheme in industrial applications in terms of feasibility and performance.</p>
ME024	<p>Research on Dynamic Balance Adjustment Method of Single Braced Frame Gyroscope Rotor Xukui Hou, Ende Wang, Hui Cao, Yalong Zhu and Kai Qi Shenyang Institute of Automation, Chinese Academy of Sciences, China</p> <p><b>Abstract.</b> The uneven mass distribution of gyro rotors results in vibration, rotation and drift of gyro rotors, which seriously affect the performance index and life of gyro rotors. However, because there is no rigid connection between the rotary shaft and the shell of the gyro rotor, the dynamic balancing machine can only balance the vibration component of the single braced frame gyroscope rotor, and can't measure the gyro rotor's rotation component. By analyzing the influence of uneven rotor mass distribution on the gyro rotor performance, a method of eliminating two rotational degrees of freedom of the gimbal in gyro rotor by mandrel is proposed, which makes the dynamic balancing machine directly measure the vibration component and the moving component of the gyroscope rotor, and simplifies the dynamic balancing debugging process.</p>
ME2003	<p>Research on Urea-related Deposit in the Exhaust Pipe of SCR System Zhu Neng, Lv Lin and Chen Shi Wuhan University of Technology, China Rules &amp; Technology Centre, China Classification Society, China</p> <p><b>Abstract.</b> At present, numbers of commercial vehicles equipped with SCR system have been observed to generate deposit on exhaust pipe wall after operation for a certain time. Deposits can be hardly dissolved in water and decomposed by heating. Once formed up, deposits are so hard to be cleaned that bringing significant influence on the SCR system and engine. In this paper, deposits in exhaust pipes for automotive diesel engines were studied by thermo-gravimetric (TG) analysis method. According to the TG results, we can see that inhibition of the polymerization reaction of HNCO to generate high polymer is the basic way to avoid deposits. Finally, we solve the deposit problem by leading the injector forward 2600mm and wrapping the whole exhaust</p>

# POSTERS

	pipe with heat preservation material.
ME3006	<p>Research and Implementation of Key Technology for Calculation of a Missile Acquiring Simulation Training System Xuedong Xue, Shuai Zhang , Ya Luo, Jian Qin and Qinglan Zhao Wu Han Mechanical Technology College, China</p> <p><b>Abstract.</b> For a missile acquiring system, there are problems such as high system failure rate, poor acquiring computer maintainability and loopholes in the calculation program during the training process of the troops. For this purpose, the acquiring professional training can get rid of the dependence on the actual equipment, and provide good hardware conditions for the training of the troops and the teaching of the college, a missile acquiring simulation training system is designed and constructed. The key to acquiring simulation training system software design is acquiring calculation, and the two technical difficulties in acquiring calculation are data format conversion and data output precision control. This paper focuses on the basic algorithms and implementation methods of self-test calculation, data format conversion and data output precision control, and solves the key technical problems of acquiring calculation in the acquiring training software.</p>
ME013	<p>Trajectory Tracking for Omnidirectional Robots with Longitudinal Slipping Renhui Zhang, Haiyan Hu and Yongsi Fu Soochow University, China</p> <p><b>Abstract.</b> This paper propose an adaptive control law for an omnidirectional mecanum robot under longitudinal slip conditions. Firstly, the control law under pure rolling is obtained on the base of Lyapunov function, and the stability of the close-loop is proved. Secondly, four unknown parameters are used to describe the wheel slip coefficient, and the tracking error differential equations under longitudinal slip are established. Then, an adaptive nonlinear feedback controller is constructed, and using an appropriate Lyapunov function to ensure the close-loop system is stable. Matlab/Simulation result confirms the effectiveness of the proposed approach.</p>
ME027	<p>Research on the Influence of Piston Constraint on the Temperature Field of Multi-disc Clutch Jie Zhang and Tieshan Zhang Nanjing University of Science and Technology, China</p> <p><b>Abstract.</b> The two-dimensional finite element model of multi-disc clutch friction pair was established by Abaqus simulation software, and the contact pressure of the friction surface under different piston constraints was calculated and analyzed. Considering contact pressure as the main heat-generating factor, the two-dimensional heat conduction process was numerically discretized by the implicit difference method. Then the temperature model of the multi-disc clutch friction pair was programmed in Matlab. The bench test verified the correctness of the temperature model. It is found that the temperature field between components is different and shows uneven distribution under the actual constraint. The local temperature of the</p>

# POSTERS

	<p>component near the concentrated load is the highest, in which the radial temperature difference is the largest. The arrangement in which the piston pressure is concentrated in middle diameter produces the lowest temperature and the smallest radial temperature difference, which can effectively avoid thermal deformation of the component due to uneven temperature distribution.</p>
ME037	<p>Residual Stresses Distributions in Grinding of 3J33 Maraging Steel with Miniature Electroplated CBN Wheel Shouguo Shen, Beizhi Li and Weicheng Guo Donghua University, China</p> <p><b>Abstract.</b> It is well known that the residual stresses on the ground surface and the subsurface can influence the service quality of a component, such as fatigue life, tribological properties, and distortion. In this paper, an experimental investigation was conducted to determine the effects of grinding force, temperature and grinding conditions, such as grinding speed, workpiece speed and grinding depth, on the surface and in-depth residual stresses distributions induced by grinding of 3J33 maraging steel with the miniature electroplated CBN Wheels. The results show that a 'hook' shaped residual stress profile is generated with the maximum compressive stresses occur at the depth of 3-14 <math>\mu\text{m}</math> below the ground surface. There is a good correlation between residual stress and cutting force, but the trend related to grinding temperature is not obvious. The main grinding parameters affecting the residual stresses distributions is grinding speed, while the workpiece speed and grinding depth have the least effect.</p>
ME2-001	<p>Microwave Roasting and Acid Leaching of Vanadium and Chromium from High Chromium Vanadium Slag with <math>\text{CaCO}_3</math> Huiyang Gao, Tao Jiang and Yingzhe Xu Northeastern University, China</p> <p><b>Abstract.</b> In this study, microwave irradiation technology was used for the calcification roasting followed by sulfuric acid leaching process. The effect of roasting temperature, <math>\text{m}(\text{CaO})/\text{m}(\text{V}_2\text{O}_5)</math>, and roasting time on the leaching ratio of vanadium were investigated and the roasted samples were characterized by TG-DSC, XRD, and SEM. The leaching ratio of vanadium can be significantly enhanced with the increasing in roasting temperature, <math>\text{m}(\text{CaO})/\text{m}(\text{V}_2\text{O}_5)</math>, and roasting time. The leaching ratio of chromium decreased with roasting temperature and increased with <math>\text{m}(\text{CaO})/\text{m}(\text{V}_2\text{O}_5)</math>, and roasting time. The optimal roasting parameters were roasting temperature of 850 <math>^\circ\text{C}</math>, the <math>\text{m}(\text{CaO})/\text{m}(\text{V}_2\text{O}_5)</math> of 0.85, and roasting time of 90 min. Under the optimal roasting parameters, the leaching ratio of vanadium reached 88.81%. While the leaching ratio of chromium is 3.98%. During roasting process, vanadium is oxidized to acid-soluble <math>\text{CaV}_2\text{O}_5</math>, <math>\text{Ca}_2\text{V}_2\text{O}_7</math>, and <math>\text{CaMgV}_2\text{O}_7</math>. After leaching, chromium mainly exists in form of chromohercynite (<math>\text{FeCr}_2\text{O}_4</math>) and chrome-manganese spinel (<math>\text{Mn}_{1.5}\text{Cr}_{1.5}\text{O}_4</math>) in leaching residues.</p>

# POSTERS

<p><b>ME3003</b></p>	<p>Damage Identification of Plate Structure Based on the Method of Modal Flexibility Curvature Difference Jiangang Zhao, Yuxiang Zhang, and Jiazhao Chen Xi'an Research Inst. of Hi-Tech., China</p> <p><b>Abstract.</b> According to the higher order modes of the structure are difficult to extract and the lower order are easy to obtain in practice, it is put forward that only uses the parameters of lower or first-order modal to constitute the modal flexibility curvature difference (MFCD) as the index of damage identification, which based on the flexibility matrix of structure being sensitive to the structure modal characteristics. Numerical analysis is made on different damage conditions of a plate structure, and the result shows that the MFCD can not only accurately identify the single-damage and multi-damage position of plate structure, but also reflect the size of damage degree. It has a great significance to apply the index into the range of damage identification of actual structures.</p>
<p><b>ME3007</b></p>	<p>Research and Experimental of MRI RF High Power Bridge Jiaping Zhou, Yingliang Li and Hua Chen Xingyi Normal University for Nationalities, China Xingaoyi Medical Medical Equipment Co. Ltd, China</p> <p><b>Abstract.</b> In this paper, a MBB (micro-scale balance bridge) (3dB) is proposed. The first, a 1/4- wavelength transmission line is equal to by a length transmission line with the lump wavelength transmission line is equal to by a length transmission line with the lump wavelength transmission line is equal to by a length transmission line with the lump design model simulated by high field frequency software and is got the optimization result. At last, a micro-scale 3dB high power RF (Radio Frequency) balance 4 Ports Bridge of MRI (Magnet Resonator Imaging) is realized with 3D PCB manufacturing and some of capacities . This Micro-Balance Bridge (MBB) is manufactured with FR4 and overall size is around 100mm 60 mm 1mm, and it size reduce 1/3 compared with plane bridge. This component is test by network analyzer 5071C with 4 ports, and with center frequency is 64MHZ, span is 50MHZ. MBB could be achieved 2 ways amplitude balance is about 0.1dB, phase balance is 1, IL(Insert Loss) is about 0.1dB, flatness is not more than 0.01dB on the operate frequency of 64MHZ 5MHZ by test result. Because the MBB is applied in MRI system and it should be withstand more than 1000W RF power, the 1000W average power is inputted to port1 and detect the power of port 2, port3 and port 4, the power of port4 is about 30dBm, the port2 and ports3 are almost 56.7dBm, and the MBB is installed on the surface of a heat sink. After 1 hours, check the temperature and it's about 2 degree centigrade changed and this is thermal equilibrium, so can be inferred this device could withstand about 1KW average power. This device is taken to integrate imaging experiment, and system configuration is XGY MRI(Xingaoyi Magnet Resonator Imaging) system of Superscan 1.5T system, this system include with the control system, RF(Radio Frequency) amplifier, gradient amplifier, XGY BB(Balance Bridge of</p>

# POSTERS

	<p>system configuration), body coil, etc. The first use the XGY BB take imaging test and get a group data; then replacement the XGY BB by MBB and take imaging test get another group data; the last analyzed the two groups data, find the MBB integrate into the MRI systems and make imaging experiment and could reduce 20% imaging time from 1.2ms to 900us, and it has good efficiency and homogeneity. So, this device has good performance, small size, and it also improves the imaging polarization efficiency.</p>
ME1006	<p>The KLMY90 # Asphalt and Its Mixture Performance Research for Gannan Area Cheng-qin Chen, Wei Zhang, Xiu-le Chen and Xiao Zhang Northwest University for Nationalities, China Key Laboratory of New Laboratory of New Building Materials and Building Energy-saving of Gansu Province, China</p> <p><b>Abstract.</b> Asphalt pavement is widely used at home and abroad because of its advantages of comfortable driving, convenient maintenance, short construction period, etc. Asphalt becomes brittle and is cracked in winter. Gannan is located in the plateau, belonging to plateau climate, low year-round temperature, often wind and rain, day and night temperature difference, strong sunlight. Therefore, the asphalt was selected with high temperature stability and low temperature ductility. The KLMY90# asphalt and its mixture were studied for the technical properties. The results showed: the content of saturates and aromatic components reduced at aging temperature; the saturated and aromatic content decreased at aging time; the saturated content decreased slowly than the content of aromatic content as the aging time decreasing; the dynamic stability increased with the asphalt-aggregate ratio; the asphalt mixture had superior performance , strong water resistance. The KLMY90# asphalt and its mixture were more suitable for paving roads for Gannan.</p>
ME2002	<p>Hydroponic System with Automated Hydrolysis Using Renewable Energy Self-Sustainable Felipe Jaimes, Brayan Collazos, Emerson Arce and Mario Chauca National University of Callao, Peru</p> <p><b>Abstract.</b> Implement a system in which the variables of temperature, humidity, luminosity, CO2 and PH developing it in a crop hydroponic that guarantees the survival of the plant. In addition to monitoring and controlling pests that could affect the plant. through an automated system with renewable energy. obtaining energy with solar and wind panels. also accumulate rainwater for watering the plants. Thus achieving a self-sustainable system, with better quality products and cultivate all kinds of food on any day of the year.</p>
ME004	<p>Energy Saving System by Means of Electrical and Georeferencial Identification of Load Pedro Palomo, Carlos Reynoso, Erick Cruz and Mario Chauca National University of Callao, Peru</p> <p><b>Abstract.</b> In this project you have the control of the passage of the current in each outlet, for example, in a house where each outlet will be registered with a certain continuous electrical power for appliances, computers, among others. Every electrical</p>

# POSTERS

	<p>device that has been registered and is connected to any outlet will work, if any other device that has not been registered is connected, it will not work in any socket. In addition, once any power outlet is connected, the system will detect where it is connected and we will know the place where it was connected. With this project we will have a lower cost of electricity and economic savings.</p>
ME009	<p>Network traffic lights with Telemetry and Wireless Connectivity Perimeter Victor España, David Cayturo, Eddy Chuchón, Ivan Advincula and Mario Chauca National University of Callao, Peru</p> <p><b>Abstract.</b> The following research document seeks to show an alternative to vehicle control systems using existing technologies to develop a system that is efficient and reliable.</p> <p>The creation and operation of a traffic light network will be presented, which will be located in an area where there is traffic congestion. The following network will reorganize, optimize, and measure the vehicular flow in real time.</p> <p>In some countries, intelligent traffic lights have been implemented, with which they have obtained satisfactory benefits by improving the vehicular flow of the places where these systems are located; for this reason we consider it necessary to use smart traffic lights in our country</p>
ME029	<p>Study on Film Characteristics of Piston-Cylinder Interface of High Pressure Common Rail Radial Piston Pump with Viscosity-Temperature-Pressure Effect Bo Qi, Yong Zhang, Guoyou Meng and Yao Ding South China University of Technology, China</p> <p><b>Abstract.</b> Aiming at the inaccuracy of equivalent viscosity method in solving the film characteristics of piston-cylinder interface of high-pressure common rail radial piston pump, the film characteristics equation of piston-cylinder interface was established based on the theory of thermo-hydrodynamic lubrication. Through the solution, the thermal properties of the piston-cylinder interface film, which accounted for viscosity-temperature-pressure effect, were studied. The effects of cam speed and film inlet pressure on the characteristics of the piston-cylinder interface film were discussed. The conclusion has certain theoretical and engineering application value for the design and basic research of piston-cylinder interface.</p>
ME014	<p>Aerodynamic Analysis of Blended Wing Body - Unmanned Aerial Vehicle (BWB-UAV) Equipped with Horizontal Stabilizers Nornashiha Mohd Saad, <b>Wirachman Wisnoe</b>, Rizal Effendy Mohd. Nasir, Zurriati Mohd Ali and Ehan Sabah Shukri Askari Universiti Teknologi MARA (UiTM), Malaysia</p> <p><b>Abstract.</b> This paper presents an aerodynamic characteristic study in longitudinal direction of UiTM Blended Wing Body-Unmanned Aerial Vehicle Prototype (BWB-UAV Prototype) equipped with horizontal stabilizers. Flight tests have been conducted and as the result, BWB experienced overturning condition at certain angle of attack. Horizontal stabilizer was added at different location and size to overcome the issue</p>

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	<p>during the flight test. Therefore, Computational Fluid Dynamics (CFD) analysis is performed at different configuration of horizontal stabilizer using Spalart - Allmaras as a turbulence model. CFD simulation of the aircraft is conducted at Mach number 0.06 or <math>v = 20</math> m/s at various angle of attack, <math>\alpha</math>. The data of lift coefficient (CL), drag coefficient (CD), and pitching moment coefficient (CM) is obtained from the simulations. The data is represented in curves against angle of attack to measure the performance of BWB prototype with horizontal stabilizer. From the simulation, configuration with far distance and large horizontal stabilizer gives steeper negative pitching moment slope indicating better static stability of the aircraft.</p>
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