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## WELCOME MESSAGE

Dear Participants,

Welcome to **Barcelona!** Welcome to participate in 2018 3rd International Conference on Mechanical, Manufacturing, Modeling and Mechatronics (IC4M 2018) and 2018 3rd International Conference on Design Engineering and Science (ICDES 2018). IC4M 2018 and ICDES 2018 are organized by Hong Kong Society of Mechanical Engineers (HKSME), and will be published on MATEC web of Conferences (ISSN:2261-236X), which will be indexed by Ei compendex, Scopus and Conference Proceedings Citation Index (Web of Science), etc.

IC4M 2018 and ICDES 2018 aim to present the latest research and results of scientists related to Mechanical, Manufacturing, Modeling and Mechatronics and other topics. This conference provides opportunities for the delegates to exchange new ideas face-to-face, to establish business or research relations as well as to find global partners for future collaborations. We hope that the conference results will lead to significant contributions to the knowledge in these up-to-date scientific fields.

We would like to thank our outstanding Keynote Speakers: Prof. Majid Reza AYATOLLAHI from Iran University of Science and Technology(IUST), Iran; Prof. Martyn Pavier from University of Bristol, UK; Prof. Eugenio Oñate Ibañez de Navarra from Technical University of Catalonia, Spain, Prof. Ruxu Du from The Chinese University of Hong Kong, Hong Kong. And our outstanding Invited Speakers: Dr. (Habilitation) Redouane Zitoune from University of Toulouse, France; Prof. Jan Detand from Ghent University, Belgium, for sharing their deep insights on future challenges and trends in.

We would like to thank all the committees for their great support on organizing the conference. We also would like to thank all the reviewers for their great effort on reviewing the papers submitted to IC4M 2018 and ICDES 2018. Special thanks to all the researchers and students who with their work and participate in the conference.

We hope you enjoy the conference, the food, the hospitality, and the beautiful and charming city of Barcelona.

HKSME Committee

## CONFERENCE VENUE AND TRANSPORT INFORMATION

### IQS (Institut Químic de Sarrià), Barcelona, Spain



#### Transportation:

##### FGC:

Línea Barcelona - Vallés de FGC:

Estación Sarrià

##### Bus:

V7 - PL. ESPAÑA / SARRIA

Línea 66 PL. CATALUÑA / SARRIA

##### Car

Ronda de Dalt: B-20

Dirección Besós

Salida 9 - Sarrià

Dirección Llobregat

Salida 7- Sant Gervasi / Bonanova / Via Augusta

Túneles de Vallvidrera: E-9 / C-16

Dirección Barcelona

Salida 2 - Plaza Borràs / Sarrià / Carretera Vallvidrera - Tibidabo / Laterales Vía Augusta

\*Parking Público en el mismo edificio

## INOTRODUCTION TO CONFERENCE SPEAKERS

### Keynote Speaker 1



**Prof. Majid Reza AYATOLLAHI**

Iran University of Science and Technology(IUST), Iran

**Biography:** Dr. Majid R. Ayatollahi (PhD, University of Bristol, UK, 1998) is distinguished professor and director of fatigue and fracture research laboratory in the School of Mechanical Engineering at Iran University of Science and Technology (IUST). His main fields of interest are fracture mechanics, and experimental and computational solid mechanics. Professor Ayatollahi is the author of a book published by Springer International in 2016 titled "Characterization of Carbon Nanotube-Based Composites Under Consideration of Defects". With an h-index=40, he has published more than 200 fully refereed papers in well-known international (ISI) journals (according to Scopus) and more than 300 papers in the proceedings of national and international conferences. He is currently a member of the editorial boards for seven international journals and has served as reviewer for more than 40 international journals. Professor Ayatollahi received a prestigious award as "National Distinguished Professor" in the year 2014 from the Iranian ministry of science, research and technology, a highly competitive award in Iran. In addition, he has achieved several awards from IUST as distinguished professor/researcher in different years. Professor Ayatollahi also received in five consecutive years a prestigious national award from the Iranian Society of Mechanical Engineers for supervising the best theses in mechanical engineering. He was member of the university research council at IUST for ten years and is currently the Iran's representative in the Asian Society of Experimental Mechanics. His research lab is now in international research collaboration with several renowned European and East Asian institutions. He has been invited as keynote speaker in several international conferences and universities.

## Keynote Speaker 2



**Prof. Martyn Pavier**

University of Bristol, UK

**Biography:** Martyn Pavier is Professor of Mechanics of Materials in the Department of Mechanical Engineering at the University of Bristol, UK. His research interests include fracture and fatigue of metals, strength of composite materials and measurement of residual stress. He has a degree and PhD from the University of Cambridge and before he arrived at the University of Bristol he worked for Cambridge Consultants, an engineering consultancy.

## Keynote Speaker 3



**Prof. Eugenio Oñate Ibañez de Navarra**

Technical University of Catalonia, Spain

**Biography:** Prof. EUGENIO OÑATE, Civil Engineer by Technical University of Valencia, Spain (1975) and PhD by University of Swansea, Wales, UK (1979), Professor of Structural and Continuum Mechanics at Technical University of Catalonia (UPC), Director of the School of Civil Engineering of Barcelona (UPC) (1983-89), founder and director of the International Center for Numerical Methods in Engineering (CIMNE, [www.cimne.com](http://www.cimne.com)) (since 1987), founder and Honorary President of the Spanish Society of Numerical Methods in Engineering (SEMNI) (since 2004), founder and Past-President of the European Community on Computational Methods in Applied Sciences (ECCOMAS) (2000-2004) and Past-President of the International for Association Computational Mechanics (IACM) (2002-2010). He has received a number of awards and honorary degrees from universities and scientific and professional organisations worldwide. He is editor of three international journals and author of three text books and some 350 scientific papers on developments and applications of finite element and particle-based methods for structural and geomechanical problems, fluid dynamics, fluid-soil-structure interaction and industrial forming processes.

For details see [www.cimne.com/eo](http://www.cimne.com/eo)

## Keynote Speaker 4



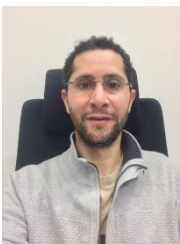
**Prof. Ruxu Du**

The Chinese University of Hong Kong, Hong Kong

**Biography:** Dr. R. Du was born in China in 1955. He received his Master's degree from the South China University of Technology in 1983 and his Ph.D. degree from the University of Michigan in 1989. He has taught in the University of Windsor, in Windsor, Ontario and University of Miami, in Coral Gables, Florida. Currently, he is a professor in the Dept. of Mechanical and Automation Engineering at the Chinese University of Hong Kong (CUHK). He is also the director the Institute of Precision Engineering of CUHK. His areas of research include: design and manufacturing, precision engineering, automation and robotics as well as water. He has published over 430 papers in various academic journals and international conferences, as well as several books. He has won many awards, including the Chinese national ten-thousand people project award, the technology leader of Guangdong Province, the Taishan Scholar of Shandong Province and etc.

He has being happily married for 32 years and has two children, Jin and Ann. He enjoys Chinese poetry and tennis.

## Invited Speaker 1



**Dr. (Habilitation) Redouane Zitoune**

University of Toulouse, France

**Biography:** Dr. (Habilitation) Redouane Zitoune is 40. He is an Associate Professor in mechanical engineering at Paul Sabatier University (University of Toulouse, France), since 2005. PhD work of Redouane Zitoune is focused on the manufacturing and machining (drilling and milling) of composite materials. His current research interests include damage analysis during drilling and milling of composite materials (with conventional machining and abrasive water jet machining) and Finite element analysis of machining. He is also interested in the thermal analysis of composite structures by using an optical fibres and finite element analysis. He has published more than 150 technical papers in national and international journals/conferences. In the area of machining of composite materials he has organized the first national conference in May 2012. This scientific event has been organized with the collaboration of the French Aerospace Lab (ONERA) and with the consent of the national Association for Composites MAterials (AMAC).

## Invited Speaker 2



**Prof. Jan Detand**  
Ghent University, Belgium

**Biography:** Jan Detand's field of research is situated in the domain of industrial design engineering. The research group of industrial design engineering (IDE) is an open research community that focuses on transdisciplinary research through design. IDE utilizes design skills such as design thinking, creativity and prototyping to interact with different stakeholders involved in the transdisciplinary research.

## **INSTRUCTIONS TO PRESENTATIONS**

### **Devices Provided by the Conference Organizer:**

Laptops (with MS-Office & Adobe Reader)  
Projectors & Screen  
Laser Sticks  
Tape

### **Materials Provided by the Presenters:**

Oral Presenter:  
PowerPoint or PDF files  
Duration of each Presentation (Tentatively)

Poster Presenter:  
Poster: 0.8m\*1m; color printing; Add Conference Name's Acronym on the top of poster(Such as"IC4M 2018")

### **Minutes of Q&A**

Keynote Speech: 40 Minutes of Presentation, 10 Minutes of Q&A  
Invited Speech: 30 Minutes of Presentation, 10 Minutes of Q&A  
Presenter: 15 Minutes of Presentation, 3 Minutes of Q&A

### **NOTICE:**

- Certificate of Participation will be awarded by Session Chair after each presentation finished.
- The organizer will not provide accommodation, so we suggest you make an early reservation.
- One best presentation will be selected from each session. The best one will be announced when each session ends, and will be awarded by the session chair after each session in the meeting room.
- The attendee should provide the Confirmation Letter of Attendance when register.



## CONFERENCE PROGRAM OVERVIEW

<b>February 22, 2018 Thursday</b>		
<b>10:00 - 17:00</b>	Registration and Conference kits collection	Sala Multimedi
<b>10:00 - 11:00</b>	hands-on activities(3Dscan, CAD optimisation, Vibrations, Robot and PLC ...)	
<b>16:00-17:00</b>	hands-on activities(3Dscan, CAD optimisation, Vibrations, Robot and PLC ...)	
<b>February 23, 2018 Friday</b>		
<b>9:00 - 9:20</b>	Opening Remark	Sala Multimedi, IQS
<b>9:20 - 10:00</b>	Keynote Speaker Prof. Eugenio Oñate Ibañez de Navarra	
<b>10:00 - 11:00</b>	Presentation Session 1	
<b>11:00 - 11:30</b>	<b>Group Photo and Coffee Break</b>	
<b>11:30 - 12:10</b>	Keynote Speaker Prof. Ruxu Du	
<b>12:10-13:10</b>	Presentation Session 1	
<b>13:10 - 14:00</b>	<b>Lunch</b>	
<b>14:00 - 14:30</b>	Invited Speaker Prof. Jan Detand	Sala Multimedi, IQS
<b>14:30 - 15:30</b>	Presentation Session 2	
<b>15:30 - 16:00</b>	<b>Coffee Break</b>	
<b>16:00 - 17:00</b>	Presentation Session 2	Sala Multimedi, IQS

<b>17:00 - 17:30</b>	Invited Speaker Dr. (Habilitated) Redouane Zitoune	Sala Multimedi, IQS
<b>February 24, 2018 Saturday</b>		
<b>9:00 - 9:40</b>	Keynote Speaker Prof. Martyn Pavier	Sala Multimedi, IQS
<b>9:40-10:40</b>	Presentation Session 3	
<b>10:40-11:00</b>	<b>Coffee Break</b>	
<b>11:00-11:40</b>	Keynote Speaker Prof. Majid Reza AYATOLLAHI	Sala Multimedi, IQS
<b>11:40-12:40</b>	Presentation Session 3	
<b>12:40-14:00</b>	<b>Lunch</b>	
<b>14:00-15:30</b>	Presentation Session 3	Sala Multimedi, IQS
<b>15:30-16:00</b>	<b>Coffee Break</b>	
<b>20:00 - 22:30</b>	<b>Dinner</b>	
<b>February 25, 2018 Sunday</b>		
<b>Pending</b>		

## SESSION OVERVIEW

<p style="text-align: center;"><b>Session 1</b></p> <p style="text-align: center;"><b>February 23,2018</b> <b>10:00 -13:10</b></p> <p>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</p>	<p><b>C2001</b> Xiao-Yu Xie</p>	A Study on the Design of Rural Material Flow System Based on the Traditional Chinese Twenty-four Solar Terms - A Case Study of Lifengjie in Liyang City, Jiangsu Province, China
	<p><b>C2002</b> Ziran Zhang</p>	The Study on Heuristic and Algorithmic Processing Creative Training on Product Design Education: Based on the Bags & Luggage design Course
	<p><b>C2003</b> XU wenjuan</p>	Survey, research and prospect of signage systems in national parks in Yunnan Province
	<p><b>C2004</b> FAN Zhong</p>	The influence of technoethics on industrial design
	<p><b>C302</b> Thomas Vervisch</p>	The design of a composite folding bike to improve the user experience of commuters
	<p><b>C304</b> Joon Shik Yoon</p>	New Portable Automatic Urinary Catheterization Device
	<p><b>C313</b> Sung-Phil Heo</p>	IoT Based Real-time Traffic Condition Providing System for User Requested Location Information
	<p><b>C314</b> Dae-Young Kim</p>	A preliminary study on the priority of business process evaluating model for design office
<p style="text-align: center;"><b>Session 2</b></p> <p style="text-align: center;"><b>February 23,2018</b> <b>14:30 - 17:30</b></p> <p>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</p>	<p><b>C002</b> Sauro J. Yague</p>	Distributed Cooperative Control for Stepper Motor Syn-chronization
	<p><b>C006</b> Kiweon Kang</p>	Structural Performance Evaluation for Vibration-based Energy Harvester utilized in Railway Vehicle
	<p><b>C009</b> Hossein Safari</p>	Transverse and Longitudinal Stress Analysis in Reinforced Welded Oil Branched Pipes
	<p><b>C010</b> Dr. Lee Yoon Ket</p>	Cyber Physical Autonomous Mobile Robot (CPAMR) Framework in the Context of

		Industry 4.0
	<b>C011</b> Fatouma MAAMAR	Evaluation criteria of stress intensity factor at the interface corner under mechanical loading
	<b>C013</b> Zhi Liu	Direct Adaptive Compensation Control of Mechanical Systems With Unknown Actuator Failures and Dead-Zone Nonlinearities
	<b>C015</b> Kanchala Sudtachat	Transportation and Production Lot-size for Sugarcane under Uncertainty of Machine Capacity
	<b>C016</b> Janusz Pobożniak	The use of virtual manufacturing features in forward manufacturing process planning
<p style="text-align: center;"><b>Session 3</b> <b>February 24,2018</b> <b>9:00 -12:00</b></p> <p>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</p>	<b>C017</b> Adrià Biosca	Glass gob modeling and experimental validation using a drop test
	<b>C020</b> İsmail OVALI	Effect of Gr contents on Wear Properties of Al <sub>2024</sub> /MgO/Al <sub>203</sub> /Gr hybrid composites
	<b>C024</b> Beom-Joon Pyun	Development of High Precision Vehicle Dynamic Model with an Intelligent Torque Transfer System
	<b>C027</b> Jung-In Yoon	Heat Transfer Characteristics of Flooded Type Evaporator for Seawater Cooling System
	<b>C008</b> Rashid Pourrajab	Bioconvection of nanofluid past stretching sheet in a porous medium in presence of gyrotactic microorganisms with newtonian heating
	<b>C029</b> Michael Monte	Vibration monitoring with low-cost MEMS accelerometers
	<b>C034</b> David Pollard	A Comparison of FDM Structural Layouts and Implementation of an Open-Source Arm-Based System
	<b>C035</b> Sang-Young Cho	Touch Screen Calibration Based on Laser Sensors
	<b>C1001</b> Seunghoon Shin	Vision-based system identification for MDOF structures
	<b>C1002</b> Wang Bo	A study on multi-body dynamic modelling and optimization for mechanical quick closing valve
	<b>C309</b> Hee-Sung Cha	Mobile application tool for individual maintenance users on high-rise residential

		buildings in South Korea
	<b>C318</b> MADHURYA DIVAKARA	K. Throughput analysis in mobile adhoc network: a literature survey.

## FULL SCHEDULE


<b>Registration</b>	
<b>February 22, 2018 Thursday</b>	
<b>10:00 -17:00</b>	
<b>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</b>	

<b>10:00-17:00</b>	Participants Registration and Conference kits Collection
<b>10:00 - 11:00</b>	hands-on activities(3Dscan, CAD optimisation, Vibrations, Robot and PLC ...)
<b>16:00 - 17:00</b>	hands-on activities(3Dscan, CAD optimisation, Vibrations, Robot and PLC ...)

<b>February 23, 2018 Friday</b>	
<b>9:00-13:10</b>	
<b>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</b>	

<b>9:00 - 9:20</b>	<b>Opening Remark</b>
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<p><b>9:20 - 10:00</b></p> <p><b>Keynote Speech</b></p>  <p>Prof. Eugenio Oñate Ibañez de Navarra Technical University of Catalonia, Spain</p>	<p><b>Title of Speech:</b> Numerical Methods in Industrial Forming Processes. Current Developments and Future Trends</p> <p><b>Abstract:</b> The lecture presents an overview of current developments and applications of the most popular numerical methods for solving problems of interest in industrial forming processes. The state of the art in the finite element method (FEM) and in a number of particle-based methods, such as the particle finite element method (PFEM) and the discrete element method (DEM) are described. We present applications of selected numerical methods to industrial forming problems such as sheet metal forming, glass forming, additive manufacturing (3D printing), casting, welding, machining, forging, etc . The future trends in the numerical methods for simulation of practical industrial forming processes are highlighted.</p>
<p><b>Presentation Session 1-A:</b></p> <p><b>February 23, 2018 Friday</b></p> <p><b>10:00 - 11:00</b></p> <p><b>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</b></p>	
<p><b>C2001</b></p>	<p><b>Presenter:</b> Xiao-Yu Xie Tongji University, China</p> <p><b>Title:</b> A Study on the Design of Rural Material Flow System Based on the Traditional Chinese Twenty-four Solar Terms - A Case Study of Lifengjie in Liyang City, Jiangsu Province, China</p> <p><b>Authors:</b> Xiao-Yu Xie, Sheng-Xi Fan</p> <p><b>Abstract:</b> In the view of Chinese traditional twenty-four solar terms, the circulation of various substances in the material flow system of base production and life is systematically analyzed, and on the basis of the existing system problem point, as well as by combining with the concept of the twenty-four solar terms and the system design method, the author reconstructs each subsystem of the base material flow system, moreover, the author eventually connects the subsystems and reconstructs a material flow system conforming to the traditional Chinese solar terms and conforming to the requirements of ecological sustainability.</p>

<p><b>C2002</b></p>	<p><b>Presenter:</b> Ziran Zhang Shanghai University of Engineering Science,China</p> <p><b>Title:</b> The Study on Heuristic and Algorithmic Processing Creative Training on Product Design Education: Based on the Bags &amp; Luggage design Course</p> <p><b>Authors:</b> Ziran Zhang , Ying Yu , Shengxi Fan and Yujing Tian</p> <p><b>Abstract:</b> In the study, context-creativity of Teresa M. Amabile was used as the foundation to apply it in the bags &amp; luggage design course. Moreover, the sectional creative training education mode of prior heuristic task and postpositional algorithmic task was proposed. 26 junior students in product design were used as the trial objects. The Consensual Technique for Creativity (CAT) was considered as the scoring standard of creative performance. In the end, the sectional theoretical framework of effective creative training in product design was finally proposed.</p>
<p><b>C2003</b></p>	<p></p> <p><b>Presenter:</b>XU wenjuan IQS School of Engineering Ramon Clemente,Spain</p> <p><b>Title:</b> Survey, research and prospect of signage systems in national parks in Yunnan Province</p> <p><b>Authors:</b> XU Wenjuan and FAN Shengxi</p> <p><b>Abstract:</b> The Signage System is essential to establishing a national park, The authors conducted surveys, analysis and research of identification signs, informational sign, directional signs and functional signs from the signage systems adopted by five national parks in Yunnan Province. Relying on the results, with reference to industry experience, years of research related to national park, successful cases of overseas national parks and the current signage systems across China's national parks, the paper aims to explore future development strategies of national park signage systems that are suitable for China.</p>

<p style="text-align: center;"><b>C2004</b></p>	<p style="text-align: center;"><b>Presenter:</b>FAN Zhong Tongji university,China</p> <p><b>Title:</b> The influence of technoethics on industrial design</p> <p><b>Authors:</b> FAN Zhong</p> <p><b>Abstract:</b> Technoethics is an interdisciplinary research area that means ethics in technology. Technology is transformed into the products in our daily life by industrial design and the negative effects of technology abuse makes ethics issues cannot be ignored. But design ethics research rarely from the perspective of technoethics, which is worth reviewing and summarizing. This review focused on the influence of technoethics on industrial design in the context of technological development. Through studying technoethics and industrial design from the 19th century, we find they have similar developing processes and the early 20th century and 1970s are two key point in time. This article aims to present the development of technoethics and industrial design intuitively on a timeline to discuss the impact on industrial design from the perspective of technoethics.</p>
<p style="text-align: center;"><b>11:00 -11:30</b></p>	<p style="text-align: center;"><b>Group Photo and Coffee Break</b>  </p>
<p style="text-align: center;"><b>11:30 -12:10</b> <b>Keynote Speech</b></p> <div style="text-align: center;">  </div> <p style="text-align: center;">Prof. Ruxu Du The Chinese University of Hong Kong, Hong Kong</p>	<p><b>Title of Speech:</b> Biomimic Robot Fish Design, Modeling and Control</p> <p><b>Abstract:</b> How fish swim is a wonder of nature: elegant, fast, quiet, and with high efficiency. It is known that the fish's propulsion efficiency is about 90%. Additionally, the speed of a sailfish can exceed 110 km/h and the acceleration of a pike can reach 249 m/s<sup>2</sup>. In comparison, the efficiency of the vastly adopted rotary propeller is only about 60%, and the performance of a typical ship, in terms of acceleration, turning, noise, and etc., is far worse than that of the fish. This motivates researchers around the world to study fish swimming and to build robot fish.</p> <p>We have been working on robot fishes for more than eight years. We designed and built a series of robot fish by mimicking not only the skeleton structure but also the muscle arrangement of the fish. The design includes a wire-driven body and a compliant tail. As a result, it can best mimic the fish flapping. Comparing to other robot fishes (single joint design, multi-joint design, and smart material design), our design is simple, easy to control and more importantly, highly efficient. Additionally, we adopted the Central Pattern Generation (CPC) control, which allows the fish to switch from one swimming mode to another easily and effectively. Based on experiments, it reaches efficiency about 80% in various conditions. As an example,</p>



with just a pack of 4 AAA size batteries, our robot fish will be able to swim for three hours at the speed of 2.4 body length / second. Its turning radius is only 0.8 body length.

**Presentation Session 1-B:**

**February 23, 2018 Friday**

**12:10 -13:10**

**Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona**



**Presenter:** Thomas Vervisch



Ghent University, Belgium

**Title:** The design of a composite folding bike to improve the user experience of commuters

**Authors:** Thomas Vervisch, Yannick Christiaens and Jan Detand

**Abstract:** Over the last years, the popularity of folding bikes has been increasing as a result of the rise of multi-modal transport. They are used by commuters as a complement to public transport. Despite the increasing popularity, the current market offer of folding bikes still represents quite some restrictions and downsides which decrease their usability. This paper shows a user-centred process of designing and prototyping a composite folding bike with the aim of improving the user experience of folding bike using commuters. By improving the usability and ease of use of folding bikes, their full potential can be unlocked. The design process led to a disruptive folding bike design with front and rear single-sided offset wheel mounting. The concept excels in its intuitive and quick folding mechanism, superior riding performance and comfort, adjustability and overall ease of use. In addition to the design process and prototyping of the folding bike, this extended abstract elaborates on the performed user tests and its results. These tests range from the impact of offset wheels to the intuitiveness of the folding mechanism and were performed in order to prove different aspects of the design. This research shows how rethinking and redesigning a bike concept (product) from scratch, using a user-centred design process and taking into account the three

**C302**

	<p>aspects — business, technology and people — can lead to a disruptive design that improves usability and the overall user experience of the stakeholders.</p>
<p><b>C304</b></p>	<div style="text-align: center;">  <p><b>Presenter:</b>Joon Shik Yoon</p> <p>Department of Physical medicine &amp; rehabilitation, Korea University Medical Center at Guro, South Korea</p> <p><b>Title:</b>New Portable Automatic Urinary Catheterization Device</p> <p><b>Authors:</b> Joon Shik Yoon, Seok Kang, Guk-Han Kim, Hyuk Choi, Hanboram Choi</p> <p><b>Abstract:</b> Intermittent catheterization (IC) is an effective bladder management strategy for the incomplete bladder emptying. We had developed an automatic urinary catheterization device. In this research, a new small-sized portable device was designed for the practical use. The device was composed of two parts; disposable part and operating part. The disposable part contains a penis cap and a lubrication system. The operating part includes motor and gears, and a rechargeable battery. The operating part was designed to push the catheter after docking of the penis cap. We made a prototype of the new portable device. This device could propel the catheter successfully. In a dummy model phantom study, the catheter was lubricated well and inserted smoothly into the bladder without any complications. We confirmed a possibility of the newly developed device that could assist performing the IC. Even a patient with upper extremity disability or a caregiver might perform the IC easily using this device.</p> </div>
<p><b>C313</b></p>	<div style="text-align: center;">  <p><b>Presenter:</b>Sung-Phil Heo</p> <p>Unmanned and Autonomous Vehicle Engineering, Kyungwoon University</p> <p><b>Title:</b> IoT Based Real-time Traffic Condition Providing System for</p> </div>

	<p>User Requested Location Information</p> <p><b>Authors:</b> Sung-Phil Heo</p> <p><b>Abstract:</b> This research proposes to employ the IoT, agent and other technologies to improve traffic conditions and relieve the traffic pressure. Information generated by traffic IoT and collected on all roads can be presented to travelers and other users. Through collected real-time traffic data, the system can recognize current traffic operation, traffic flow conditions and can predict the future traffic flow. The system may issue some latest real-time traffic information that helps drivers choosing optimal routes. A computer program may use GPS coordinates associated with cell phones located within multiple cars to measure real time traffic conditions. These traffic conditions may be measured based at least in part on using parameters including, but not limited to a time of day, a day of the week, a weather condition, a road condition, or some other parameter relating to traffic conditions. The traffic conditions may be used to calculate a vehicle speed between two locations and predict related travel time. The real-time traffic condition information may be manually accessed by a user from their cell phone or automatically presented to a user's cell phone when the cell phone enters a specific geographic location or region. In this paper, we describe a system for detecting a peripherally located vehicle based on a location of a user or a particular point on a map which point is selected by a user, so as to be provided with real-time traffic images captured by a smart device installed in the detected vehicle.</p>
C314	<p><b>Presenter:</b>Dae-Young Kim</p> <p>Pusan University,South Korea</p> <p><b>Title:</b> A preliminary study on the priority of business process evaluating model for design office</p> <p><b>Authors:</b> Dae-Young Kim</p> <p><b>Abstract:</b> Considering that we are at the initial phase of application Business Process Management model, a sequential application plan must be taken for each unit task. Adapting Business Process Management into the enterprise recourse of the construction industry across all business process could cause problems due to rapid change in corporate operation systems. Further, it is unable to predict potential risks while Business Process Management are being applied. Therefore, applying Business Process Management model to the core strategy and task seems more effective than applying Business Process Management model to the entire enterprise recourse planning. In that case, it is desirable to get feedbacks about</p>

	<p>the problem in the procedure and apply it to other operations accordingly. We finally suggested the definition of Business Process Management model by analyzing each business unit so that we could propose and generalize value chain and business process architecture suitable for design office. Furthermore, by evaluating each business unit (which is included in the business process architecture), based on quantitative standards, we presented a sequential application plan for business process model.</p>
<p><b>13:10 -14:00</b></p>	<div style="text-align: center;">  <p><b>Lunch</b></p> </div>
<p><b>14:00-14:30</b></p> <p><b>Invited Speech</b></p>  <p>Prof. Jan Detand Ghent University, Belgium</p>	<p><b>Title of Speech:</b> Co-creating real-life experiences through the dialectic of system thinking and design</p> <p><b>Abstract:</b> Design has, since its advent in the early 20th century, evolved from a product perspective (constructivism), to a designerly process perspective (design thinking) and is now entering a new era that uses systemic design methods to solve complex societal "wicked problems" (Rittel and Webber 1973). Dialectic design (Buchanan 2001) unites Herbert Simon's science for the artificial and John Dewey's pragmatic view on design (Dalsgaard 2014), which has led to a design thinking approach. Even this perspective is now blurring out when considering the design of sustainable and complex systems designed for interaction and evolution. Therefore, the design paradigm must be shifted towards a "purpose" driven system design perspective. Verganti (2009) gives us insight into the world of what radical innovation (and change) means for society. He also indicates that we should avoid overabundance and rather focus on designing meaningful products (Verganti 2017).</p> <p>The "system design" approach that is proposed and adopted by the Industrial Design Centre of Ghent University Campus Kortrijk is one focusing on purpose driven design by incremental and collaborative change. It unites the dialectic of an abstract cybernetic design model (Krippendorff 2007) and a tangible realization (call it prototype) of the designed artifact. The intended and unintended uses of the design become gradually visible through a conversation (Dubberly and Pangaro 2009) and interaction of the product in a living lab environment.</p> <p>Multiple research perspectives on the design problem (Ghent University council, 2015) are approached by bringing all involved stakeholders – experts from different specialisms, designers and end-users – together in an iterative collaborative change process</p>

(using co-creation methods). Prototyping real-life experiences in a living space plays a central role as integration and communication method throughout the development cycle. During every iteration, a co-experience is obtained by all involved stakeholders by directly interacting with the prototype in a real "make" or "use" context. These interactions gradually reveal affordances and disturbances by iterative adaptations.

The real-life experience can be obtained by simultaneously realizing (1) the product, (2) the activity of interaction and (3) its context of use. This is dialectically realized as an continuously updated cybernetic model (describing the abstract dynamic model) as well as through a threefold low-to-high fidelity prototype of the product, activity and context that is functioning as a living lab experiential playground.

This research through design principle is a double loop learning method. In the first iteration loop, the project is gradually enveloped towards a specific goal using adaptive strategies (designing). If the goal is not fitting with the expectations and requirements a second order loop is formed in order to find the real goal using adapting strategies (research, reflection).

This particular method will be illustrated by some specific student project cases in the domain of health-care (reminiscence game for people with dementia) and societal problems (urban community gardening and composting).

## **Presentation Session 2-A:**

**February 23, 2018 Friday**

**14:30 -15:30**

**Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona**

**C002**


**Presenter:**Sauro J. Yague

IQS School of Engineering Ramon Clemente,Spain

**Title:** Distributed Cooperative Control for Stepper Motor Syn-chronization

**Authors:** Sauro J. Yague, Guillermo Reyes Carmenaty, Alejandro Rolán Blanco, and Aurelio García Cerrada

**Abstract:** This paper describes the design and simulation of a distributed cooperative control algorithm based on multi-agents to

	<p>synchronize a group of stepper motors. Modeling of the two-phase hybrid stepper motor in closed loop is derived in rotary reference frame, based on field-oriented control techniques to provide torque control. The simulation obtained by MATLAB-Simulink shows that the distributed cooperative control effectiveness depends on the network topology defined by the graph.</p>
<p><b>C006</b></p>	<p style="text-align: center;"><b>Presenter:</b> Kiweon Kang Kunsan National University, South Korea</p> <p><b>Title:</b> Structural Performance Evaluation for Vibration-based Energy Harvester utilized in Railway Vehicle</p> <p><b>Authors:</b> Kiweon Kang, Jiwon Jin</p> <p><b>Abstract:</b> This study aims to assess the structural performance and structural integrity of vibration energy harvester (VEH). For this, the structural performance test were conducted to identify the natural frequency and structural response against frequency. And then, static structural analysis was performed using finite element analysis to investigate the failure critical locations (FCLs). Finally, we conducted the frequency response analysis in frequency domain to obtain the structural response with frequency and investigate the structural integrity of VEH. Using the above results, we assessed the structural performance and structural integrity of two types of VEHs.</p>
<p><b>C009</b></p>	<div style="text-align: center;">  </div> <p style="text-align: center;"><b>Presenter:</b> Hossein Safari National Iranian South Oil Company (NISOC), Ahvaz, Iran</p> <p><b>Title:</b> Transverse and Longitudinal Stress Analysis in Reinforced Welded Oil Branched Pipes</p> <p><b>Authors:</b> Hossein.safari; Rashid Pourrajab; Amin Yaghootian</p> <p><b>Abstract:</b> Welding process results in the non-uniform distribution of heat. Combined with thermal strain, plastic deformation and welding-induced distortion, it causes important problems such as failure. This study models welding process in a <math>12 \times 16</math> split tee junction using finite element. This junction is a reinforcing branch used in the hot taping of oil pipe line. The model is studied in 3D state. This zone, i.e. heat affected zone (HAZ) is of high importance due to the existence of a severe temperature gradient and stress in the vicinity of HAZ. This study analyses single pass butt welding with</p>

	<p>a cooling time of 2700 seconds. In order to apply boundary conditions to the model, the studied structure should be in Free State according to practical procedure. The main aim of this simulation is to analyse Longitudinal and transverse residual stresses originated from co-directional and opposite-directional welding. This joint is formed of two semicircles welded to each other as linear single pass welding. Two welders simultaneously welded both sides of the pipe.</p>
<p><b>C010</b></p>	<div data-bbox="884 504 1046 712" data-label="Image"> </div> <p style="text-align: center;"><b>Presenter:</b> Lee Yoon Ket</p> <p style="text-align: center;">Tunku Abdul Rahman University College, Malaysia</p> <p><b>Title:</b> Cyber Physical Autonomous Mobile Robot (CPAMR) Framework in the Context of Industry 4.0</p> <p><b>Authors:</b> Yoon Ket Lee; Yeh Huann Goh; Yiqi Tew</p> <p><b>Abstract:</b> Industry 4.0 or Smart Manufacturing creates intelligent object networking and independent process management through Internet of thing and data services. Cyber-Physical System (CPS) communicates among humans, machines and products through Internet of Things (IoT). In this paper a cyber physical autonomous mobile robot (CPAMR) IoT infrastructure system has been proposed. It is capable of performing human-machine interact by allowing users to place and manage orders using cloud platform. The Enterprise Resource Planning (ERP) system processes the data and send the product's data to Radio-frequency identification (RFID) tag system for storage and printout. Through Remote Telemetry Unit (RTU), the status of the product, CPAMR system and workstations or machineries are linked to the cloud platform. Initially, system identify the locations of CPAMR, product and the desired workstation. After gathering all the required information, Artificial Intelligence Algorithms (AIA) performs real time route map planning according to the shortest distance between CPAMR and the destination. This route map planning will then be sent to the CPAMR's micro-controller for operation. While the CPAMR is moving, it moves according to the planned route map with the assistance of the Obstacle Avoidance System until it reaches the destination and notifies cloud platform. Three individual projects representing three main functions of the proposed CPAMR have been carried out. Results show that the framework of the project is viable.</p>

<p><b>15:30-16:00</b></p>	<p><b>Group Photo and Coffee Break</b>  </p>
<p><b>Presentation Session 2-B:</b>  <b>February 23, 2018 Friday</b>  <b>16:00 -17:00</b>  <b>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</b></p>	
<p><b>C011</b></p>	<p><b>Presenter:</b>Fatouma MAAMAR  ALGERIAN SPACE AGENCY</p> <p><b>Title:</b> Evaluation criteria of stress intensity factor at the interface corner under mechanical loading</p> <p><b>Authors:</b> Fatouma MAAMAR</p> <p><b>Abstract:</b>In this paper, a numerical model developed for the analysis the stress intensity factor containing a single lap joint is presented. It is shown that the evaluated the stress intensity factor, in a deformation plane 2D domains based by criteria for the finite element method. This type of criteria is known as an error or index of efficiency due to rounding and the numerical integration that is generally very small. With this criterion, the designer can accurately evaluate the mechanical integrity space devices.</p>
<p><b>C013</b></p>	<p><b>Presenter:</b> Zhi Liu  Guangdong University of Technology, China</p> <p><b>Title:</b> Direct Adaptive Compensation Control of Mechanical Systems With Unknown Actuator Failures and Dead-Zone Nonlinearities</p> <p><b>Authors:</b> Xiaohang Su, Liu Zhi</p> <p><b>Abstract:</b> In this paper, a new tuning function backstepping control scheme is proposed for a class of parametric strict feedback nonlinear systems to accommodate actuator failures/faults and dead-zone constraints, where the failures/faults are uncertain in time, pattern, and values, and the dead-zone parameters are not available. Roughly speaking, such a scheme is developed in two steps</p>



	<p>below. First, by using an adaptive smooth inverse function to compensate for the dead-zone nonlinearity, we separate the coupling actuator dynamics into two parts, i.e., the dead-zone compensation errors and the nominal failure dynamics. Afterward, we further handle these two parts based on the techniques of robust adaptive approach and parametrization method. With our scheme, the global boundedness of the signals in the closed-loop system are ensured, and the tracking error is steered to zero asymptotically. These results have also been verified through simulation studies.</p>
<p><b>C015</b></p>	<div data-bbox="884 696 1051 878" data-label="Image"> </div> <p><b>Presenter:</b> Kanchala Sudtachat                  Suranaree University of Technology,Thailand</p> <p><b>Title:</b> Transportation and Production Lot-size for Sugarcane under Uncertainty of Machine Capacity</p> <p><b>Authors:</b>Kanchala Sudtachat</p> <p><b>Abstract:</b> The integrated transportation and production lot size problems is important effect to total cost of operation system for sugar factories. In this research, we formulate a mathematic model that combines these two problems as two stage stochastic programming model. In the first stage, we determine the lot size of transportation problem and allocate a fixed number of vehicles to transport sugarcane to the mill factory. Moreover, we consider an uncertainty of machine (mill) capacities. After machine (mill) capacities realized, in the second stage we determine the production lot size and make decision to hold units of sugarcane in front of mills based on discrete random variables of machine (mill) capacities. We investigate the model using a small size problem. The results show that the optimal solutions try to choose closest fields and lower holding cost per unit (at fields) to transport sugarcane to mill factory. We show the results of comparison of our model and the worst case model (full capacity). The results show that our model provides better efficiency than the results of the worst case model.</p>
<p><b>C016</b></p>	<p><b>Presenter:</b>Sauro J. Yague                  IQS School of Engineering Ramon Clemente,Spain</p>

	<p><b>Title:</b> Distributed Cooperative Control for Stepper Motor Syn-chronization</p> <p><b>Authors:</b> Sauro J. Yague, Guillermo Reyes Carmenaty, Alejandro Rolán Blanco, and Aurelio García Cerrada</p> <p><b>Abstract:</b> CAPP system is the missing link between CAD/CAM system. Two types of operation of CAPP systems can be distinguished. The first one is the backward process planning, where the part is transformed from its ready state to the stock state. The second method is the forward planning, where the stock is transformed into the finished part. Backward process planning allow for the greater degree of automation, but is difficult for the acceptation among the industrial users. One of the problem in the forward process planning is the necessity to use the manufacturing features which do not occur in the finished part, they occur only in the part intermediate states. The paper propose so called virtual manufacturing features to solve this problem.</p>
<p><b>17:00- 17:30</b></p> <p><b>Invited Speech</b></p>  <p>Dr. (Habilitation) Redouane Zitoune University of Toulouse, France</p>	<p><b>Title of Speech:</b> Challenge when dilling of hybrid material made of CFRP/Al</p> <p><b>Abstract:</b> The one-shot drilling of hybrid materials made of composite and metallic parts represent a real challenge in the aeronautic and aerospace fields. In this study, a hybrid structure made of carbon fibre reinforced plastics and aluminium alloy was drilled without lubricant. The influence of the machining parameters (spindle speed and feed rate), the tool geometry a well as the nature of coating on the holes quality as well as the chip formation were analyzed. Tools used for drilling are made of tungsten carbide, with and without coating. The coating tested are : diamond, nano-crystalline type referred to as nc-CrAlN/a-Si3N4 and the TiAlN. The experimental results show that the shape and the size of the chips are strongly influenced by the choice of the feed rate. The thrust force generated during drilling of the composite plate with coated tools is 10 % to 15 % less compared with the thrust force generated during drilling tools without coating. Moreover, the thrusts forces in the aluminium are 50% less with coated drills compared to thrust force generated without coated drills. Also the nano-coated drills make it possible to carry out holes in the composite plates and aluminium with surface roughness 50 % better compared with those obtained with standard tools.</p>

**February 24, 2018 Saturday**

**9:00 -9:40**

**Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona**

**9:00- 9:40**

**Keynote Speech**



Prof. Martyn Pavier  
University of Bristol,  
UK

**Title of Speech:** Measurement of through-thickness assembly stress in curved composite structures

**Abstract:** The latest generation of civil aircraft use carbon fibre composite components throughout their structure. Some of these components have very large sections, sometimes up to 50 mm or more in thickness. Typical examples are wing skins and landing gear attachment ribs. For such components, residual stresses introduced during the manufacturing process will exist and require quantification to ensure safe and economic operation. Currently there are few techniques available to measure these residual stresses.

An issue with composite structures is the existence of assembly stress. Because of the manufacturing methods that are used, composite components cannot be made to precise geometric tolerances. Therefore, when the airframe is assembled from such components a type of residual stress called an assembly stress is generated. Assembly stresses may exist in the direction normal to the plies, termed here the through thickness direction. Such assembly stresses may be generated by applying a bending moment to a component with curvature, a wing spar for example. Since a layered composite material has a lower strength in this direction, these assembly stresses are a particular concern.

The work described in this paper is an attempt to measure the through thickness stress in the corner of an L shaped component under simulated assembly stress conditions. The specimen was cured in an autoclave from 56 plies of AS4/8552 with a stacking sequence of  $[(0 /45 /-45 /90 )7]_s$ . The legs of the specimen were 110 mm long and the thickness was 14 mm.


Load of 1.5 kN was applied to the specimen using a test machine. The load was then locked into the specimen using a turnbuckle arrangement and the specimen removed from the test machine. The through-thickness stress was then measured using a modification of the deep hole drilling (DHD) method. The measured through thickness component of stress was compared with that predicted by 3D finite element analysis with acceptable agreement. Predictions and measurements showed the magnitude of stress to be of the order of 15 MPa.




**Presentation Session 3-A:**

**February 24, 2018 Saturday**


**9:40 -10:40**


**Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona**

<p><b>C017</b></p>	<p style="text-align: center;"><b>Presenter:</b> Adrià Biosca</p> <p style="text-align: center;">IQS School of Engineering Ramon Clemente,Spain</p> <p><b>Title:</b> Glass gob modeling and experimental validation using a drop test</p> <p><b>Authors:</b>Adrià Biosca Salvador Borrós, Vicenç Pedret Clemente, and Andrés-Amador García Granada</p> <p><b>Abstract:</b>Glass blowing to create bottles with specific thickness distribution profiles requires several experimental iterations. Such iterations are expensive and increase the time to market. The use of simulation pretends to decrease the amount of prototypes by doing virtual validation of glass blowing molds. To feed simulations with realistic physical values, a gob drop test has been designed. This test provides valuable experience on the use of the software and validates heat transfer, viscosity and other physical parameters. Gob drop test was chosen for the possibility to record the test with infrared thermal cameras. Gob obtained similar shapes when dropped on a cast iron plate for both central and side sections with longer cooling of about 25° C. Such technique allowed the user to gain experience on the use of software and obtain valuable physical parameters for future glass blowing optimization.</p>
<p><b>C020</b></p>	<div style="text-align: center;">  <p><b>Presenter:</b> İsmail OVALI</p> <p>Pamukkale University,Turkey</p> </div> <p><b>Title:</b> Effect of Gr contents on Wear Properties of Al2024/MgO/Al2O3/Gr hybrid composites</p> <p><b>Authors:</b>İsmail ovalı; Cemal Esen; Sevda Albayrak; Halil karakoç</p> <p><b>Abstract:</b> In the present study, hybrid metal matrix composites, Al2024/10Al2O3, Al2024/10Al2O3/3MgO, Al2024/10Al2O3/6MgO, Al2024/10Al2O3/3MgO/1.5 Gr, Al2024/10Al2O3/3MgO/3Gr, and reinforcement samples (AA 2024) produced with powder metallurgy process. AA 2024 and reinforcement powders were determined mixture ratios and separately mixed during 30 minutes in a three-dimensional Turbula mixer. The mixed compositions were</p>


	<p>pressed at 300 MPa and sintered at 550 ° C during 1 h. After that, three materials were extruded at the same temperature. Experimental results show that hybrid metal matrix composites (HMMCs) a better wear resistance than the reinforcement samples because of higher hardness. Gr behave as a lubricant during wear process. The wear resistance of HMMCs can be optimized with controlling of the reinforcement content and type.</p>
<p><b>C024</b></p>	<div style="text-align: center;">  <p><b>Presenter:</b> Beom-Joon Pyun KATECH</p> </div> <p><b>Title:</b> Development of High Precision Vehicle Dynamic Model with an Intelligent Torque Transfer System</p> <p><b>Authors:</b> m-Joon Pyun, Chul-Woo Moon, Chang-Hyun Jeong and Do-Hyun Jung</p> <p><b>Abstract:</b>High precision vehicle simulation environment is required for development of control system of any newly suggested intelligent system. Hence, a high precision full-vehicle simulation environment integrated with an intelligent torque transfer system should be developed for an advanced control logic for enhancement of vehicle stability. In the perspective of making enhanced AWD system, there are many kinds of methods to make the system. And a controller part of the AWD module is regarded as a major part of the system development in consideration of enhancement of the vehicle stability with the suggested AWD system. Therefore, in this study, high precision full-vehicle simulation environment is developed for the development of an intelligent control system of the AWD module. In order to make models for the simulation, vehicle test is performed with a commercial vehicle, and the several performance tests of the developed AWD system are also conducted in a laboratory. Then, the simulation environment comprised of several models of important sub-systems is developed based on the previously conducted test results, and the developed simulation environment is verified by comparing the simulation results to the test results.</p>
<p><b>10:40-11:00</b></p>	<p style="text-align: center;"><b>Coffee Break</b>  </p>
	<p><b>Title of Speech:</b>Crack Growth Retardation in Metallic Structures Using a New Hole Drilling Method - Numerical Simulation and</p>

<p><b>11:00-11:40</b> <b>Keynote Speech</b></p>  <p>Prof. Majid Reza AYATOLLAHI Iran University of Science and Technology(IUST), Iran</p>	<p>Experimental Study</p> <p><b>Abstract:</b> Cracks can be generated in metallic structures after a high number of fatigue cycles. While the replacement of the cracked component by a new one is often costly and time-consuming, it is preferred to enhance the fatigue life of the component or structure even in the presence of a pre-existing crack. One of the favorite and simple methods for the life enhancement and crack retardation is drilling a hole in the vicinity of the crack tip. The drilled hole turns the crack into a notch and reduces the stress concentration around the crack tip significantly. In this study, a new idea is used in which instead of a single hole, two symmetric and interconnected holes are drilled at the crack tip. The main concept of double stop-hole technique is to diminish the stress singularity at the crack tip and also to reduce the stress concentration at the edge of stop holes in the cracked structural elements. The fatigue crack growth retardation is investigated both experimentally and numerically to examine the efficiency of proposed double stop-hole method. The distance between the centers of the holes is considered as the main parameter affecting the efficiency of this method. Pure mode-I loading conditions are applied to the single edge-notch tension (SENT) specimens made of a high strength steel and the crack length is recorded in terms of the number of elapsed fatigue cycles. Both the finite element results and the experimental data show that the fatigue life enhancement caused by the double stop-hole method is significantly more than that of the conventional single stop-hole method. Therefore, by very little extra cost and effort, considerable crack growth retardation is achieved when the new technique is employed.</p>
<p><b>Presentation Session 3-B:</b> <b>February 24, 2018 Saturday</b> <b>11:40 -12:40</b> <b>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</b></p>	
<p><b>C027</b></p>	<p><b>Presenter:</b> Jung-In Yoon Pukyong National University, South Korea</p> <p><b>Title:</b> Heat Transfer Characteristics of Flooded Type Evaporator for Seawater Cooling System</p> <p><b>Authors:</b> Jung-In Yoon, Chang-Hyo Son, Hyung-Min Han, Kwang-Seok</p>





	<p>Lee, Jung-Mok Lee, In-Duck You</p> <p><b>Abstract:</b> In these days, many studies on ocean fisheries have been conducted for developing their own industries. Especially, the efforts of using seawater cooling system were actively conducted to keep the caught fisheries fresh, increase the catches, and decrease the manpower. The purpose of this study is to suggest design criteria of seawater cooling system using the flood-type evaporator. In this study, the seawater cooling system using flooded-type evaporator was manufactured as a prototype capacitating 15kW. This study examined performance of the seawater cooling system and then compared the performance with the system capacitating 163kW and 238kW, which is actually being loaded on the fishery boats. In addition, heat transfer characteristics of the flooded-type evaporator used in the equipment are analysed.</p>
<p><b>C008</b></p>	<p style="text-align: center;"><b>Presenter:</b> Rashid Pourrajab</p> <p style="text-align: center;">Shohadaye Hoveizeh University of technology</p> <p><b>Title:</b> Bioconvection of nanofluid past stretching sheet in a porous medium in presence of gyrotactic microorganisms with newtonian heating</p> <p><b>Authors:</b> Rashid Pourrajab;Aminreza Noghrehabadi</p> <p><b>Abstract:</b> In this study, the effect of Newtonian heating on the boundary layer flow and heat transfer over a stretching surface in a porous medium in the presence of gyrotactic microorganisms and nanoparticle fractions. The governing equations are reduced to a system of couple non-linear ordinary differential equations, subjected to the Boussinesq approximation and asymmetric heat conditions. The reduced governing ordinary differential equations are then solved numerically. The solutions obtained are graphically represented. The effects of the controlling parameters on the flow, heat, nanoparticle concentration and the density of motile microorganisms have been examined. The results of the present study show the flow velocity, heat and mass transfer and motile microorganism characteristics on the stretching sheet are strongly influenced by the bioconvection parameters and Newtonian heating.</p>
	<div style="text-align: center;">  <p><b>Presenter:</b> Michael Monte</p> <p>Ghent University Campus Kortrijk</p> <p><b>Title:</b> Vibration monitoring with low-cost MEMS accelerometers</p> </div>

<b>C029</b>	<p><b>Authors:</b> Michael Monte, Bram Vervisch, Jonathan Deschodt</p> <p><b>Abstract:</b> Condition monitoring in rotating machinery is constantly gaining popularity in the field of vibration analysis. Nevertheless, the investment (hardware and software) for the analysis is still a great barrier for SMEs. These companies still use preventive or even breakdown maintenance as a strategy. However, since the introduction of microelectromechanical systems or MEMS, there has been a revolution in the world of sensors. These sensors are small, cheap and easily embedded in all kinds of electronic devices. Open-source software is also gaining popularity (Python, Octave ...) and combined with user-friendly hardware such as Arduino, this creates new possibilities in the world of vibration based condition monitoring.</p>
<b>12:40 -14:00</b>	<div style="text-align: center;">  <p><b>Lunch</b></p> </div>
<p><b>Presentation Session 3-C:</b></p> <p><b>February 24, 2018 Saturday</b></p> <p><b>14:00 -15:30</b></p> <p><b>Sala Multimedi, IQS, Via Augusta 390, E08017, Barcelona</b></p>	
<b>C034</b>	<p style="text-align: center;"><b>Presenter:</b> David Pollard</p> <p style="text-align: center;">University of Bristol, United Kingdom</p> <p><b>Title:</b> A Comparison of FDM Structural Layouts and Implementation of an Open-Source Arm-Based System</p> <p><b>Authors:</b> D. Pollard, G. Herrmann, C. Ward, J. Etches</p> <p><b>Abstract:</b> Fused Deposition Modelling (FDM) is a manufacturing process to build components in a layer-by-layer approach through extrusion of polymers from a movable nozzle, allowing for significantly higher degrees of complexity over machined parts. Current FDM systems typically use actuation provided through a gantry or delta structural layout, operating through depositing successive planar layers in a 2.5D process; it has been shown in numerous studies the bonding between layers has significantly lower strength than the homogeneous material or in-plane properties - an</p>



	<p>issue which can be mitigated through the deposition of curved layers. This paper compares four differing structural layouts of FDM systems (gantry, delta, Stewart Platform, and arm-based) to identify the key advantages of an arm-based method as the increased workspace and manipulability enabling "Additive Finalisation" of components, and suitability for curved layer FDM. Details are then presented of the open-source implementation and evaluation of a 6 degree-of-freedom arm-based FDM printer at the University of Bristol.</p>
<p><b>C035</b></p>	<p style="text-align: center;"><b>Presenter:</b> Sang-Young Cho</p> <p style="text-align: center;">Hankuk University of Foreign Studies, South Korea</p> <p><b>Title:</b> Touch Screen Calibration Based on Laser Sensors</p> <p><b>Authors:</b> Seung Byum Seo and Sang-Young Cho</p> <p><b>Abstract:</b> Interactive learning is becoming important in teaching and learning. In particular, the electronic board has educational significance in terms of being able to share and discuss learner's contents with instructors. However, the existing electronic board is not easily used in an educational environment due to the high cost and complicated installation process. This paper propose a mathematical model to calibrate the position of user coordinates by installing two laser sensors and a reflector on a wall. We virtually locate 9 points with software. To validate the algorithm, Raspberry Pi2 is used as a virtual sensor and simulation was performed by PC using RS-232 communication. This algorithm is powerful because up to four pre-saved coordinates are used to provide the higher accuracy.</p>
<p><b>C1001</b></p>	<div style="text-align: center;">  </div> <p style="text-align: center;"><b>Presenter:</b> Seunghoon Shin</p> <p style="text-align: center;">Kyungpook National University</p> <p><b>Title:</b> Vision-based system identification for MDOF structures</p> <p><b>Authors:</b> Seunghoon Shin, Hongjin Kim</p> <p><b>Abstract:</b> Vision-based system identification method is presented. For system identification, displacement is a good source for estimating dynamic characteristics. However, it is not easy to measure displacement of MDOF structures.</p> <p>In this method, from the dynamic displacement responses measured</p>

	<p>by vision-based technique, the dynamic characteristics (natural frequency, modeshape, and damping ratio of MDOF structures) are extracted after the processes of converting the displacement from recorded images. A shaking table tests on a three-story shear frame was conducted to validate the proposed technique. The SI results from the laser LVDT-based method were compared with those from the proposed technique and showed good agreement, which confirms the validity and applicability of the proposed vision-based SI technique for MDOF structures.</p>
<p><b>C1002</b></p>	<p style="text-align: center;"><b>Presenter:</b> Wang Bo</p> <p style="text-align: center;">Research Institute of Physical and Chemical Engineering of Tianjin, China</p> <p><b>Title:</b> A study on multi-body dynamic modelling and optimization for mechanical quick closing valve</p> <p><b>Authors:</b> Wang Bo , Li Junyan, Wu Lifang and Chen Xuekai</p> <p><b>Abstract:</b> The multi-body dynamic modelling and optimization methods of mechanical quick closing valve are studied in this paper. The Lagrange equation is specified characterizing the closing process. Normal contact force and tangent friction force between the components are obtained by using equivalent spring-damper model and no-linear coulomb friction model. The theoretical result of the valve's kinematic response is verified by the experiment. In order to analyse the relationship between structural parameters and the closing behaviour intuitively, a single degree of freedom model is provided. It is shown that the mass of the control rod is the key parameter exerting important influence on the cut-off time of the valve. The cut-off time will be shortened by about 1.2ms while the mass of control rod reduces 0.01kg.</p> <p>Key words. quick closing valve, multi-body dynamic modelling, contact force model, no-linear friction model, structure optimization</p>
<p><b>C309</b></p>	<p style="text-align: center;"><b>Presenter:</b> Hee-Sung Cha</p> <p style="text-align: center;">Department of Architectural Engineering, Ajou University, Suwon, South Korea</p> <p><b>Title:</b> Mobile application tool for individual maintenance users on high-rise residential buildings in South Korea</p> <p><b>Authors:</b> Hee-Sung Cha , Jun Kim, Do-Hee Kim, Jia Shin and Kun-Hee Lee</p> <p><b>Abstract:</b> Since 1980's, the rapid economic growth resulted in so many aged apartment buildings in South Korea. Nevertheless, there is insufficient maintenance practice of buildings. In this study, to</p>

	<p>facilitate the building maintenance the authors classified the building defects into three levels according to their level of performance and developed a mobile application tool based on each level's appropriate feedback. The feedback structure consisted of 'Maintenance manual phase', 'Online feedback phase', 'Repair work phase of the specialty contractors'. In order to implement each phase the authors devised the necessary database for each phase and created a prototype system that can develop on its own. The authors expect that the building users can easily maintain their buildings by using this application.</p>
<p><b>C318</b></p>	<div style="text-align: center;">  <p><b>Presenter:</b>MADHURYA K. DIVAKARA</p> <p>BIRLA INSTITUTE OF TECHNOLOGY &amp; SCIENCE, DUBAI CAMPUS,UAE</p> <p><b>Title:</b> Throughput analysis in mobile adhoc network: a literature survey</p> <p><b>Authors:</b> Madhurya Kodialbail Divakara and Dr. A. R. Abdul Rajak</p> <p><b>Abstract:</b> A rapid advancement in the area of mobile networks has been observed over the recent years due to the spread of reasonable, existing wireless devices. Hence it has given way to numerous opportunities to many researchers to work on Mobile Adhoc Networks. There are several key challenges in implementing the MANETS. It does not use any existing infrastructure or centralized administration. Each mobile node acts as a router. Due to its dynamic features, they are endangered. This paper provides a detailed study and throws light on the MANETS Topology in Wireless Adhoc Networks and focusses on performance parameters throughput, end to end delay and network load, its effect on the performance of the MANET network depending upon the number of users.</p> </div>
<p><b>15:30-16:00</b></p>	<p style="text-align: center;"><b>Coffee Break</b>  </p>
<p><b>20:00-22:30</b></p>	<p style="text-align: center;"><b>Dinner</b> </p>
<p><b>February 25, 2018 Sunday</b></p>	

<b>Pending</b>
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## POSTER PRESENTATION

<b>C304</b>	<p><b>Title: New Portable Automatic Urinary Catheterization Device</b></p> <p><b>Authors:</b> Joon Shik Yoon, Seok Kang, Guk-Han Kim, Hyuk Choi, Hanboram Choi</p> <p><b>Abstract:</b> Intermittent catheterization (IC) is an effective bladder management strategy for the incomplete bladder emptying. We had developed an automatic urinary catheterization device. In this research, a new small-sized portable device was designed for the practical use. The device was composed of two parts; disposable part and operating part. The disposable part contains a penis cap and a lubrication system. The operating part includes motor and gears, and a rechargeable battery. The operating part was designed to push the catheter after docking of the penis cap. We made a prototype of the new portable device. This device could propel the catheter successfully. In a dummy model phantom study, the catheter was lubricated well and inserted smoothly into the bladder without any complications. We confirmed a possibility of the newly developed device that could assist performing the IC. Even a patient with upper extremity disability or a caregiver might perform the IC easily using this device.</p> <p>This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (NRF-2015R1D1A1A09058563).</p>
<b>C004</b>	<p><b>Title: Measurement of Residual Stresses and Toughness in Ti-6Al-4V Material Produced by Laser Beam Manufacturing</b></p> <p><b>Authors:</b> Olivier Quénard, Olivier Dorival, Philippe Guy, Kevin Brethome</p> <p><b>Abstract:</b> This study deals with the measurement of residual stress by the hole drilling method in Ti-6Al-4V samples obtained by Laser Beam Manufacturing after stress relieving. Indeed, it was of high interest to check the efficiency of such a thermal post-treatment. The influence of the orientation of both the sample and the notch is evaluated from a toughness point of view, and the obtained values are compared to that of similar parts submitted to Hot Isostatic Pressing after stress relief treatment. A more isotropic behaviour were detected on the HIPed samples (with respect to that of the stress relieved ones) with a higher average value. Th</p>

	<p>is development is discussed from both residual stress and microstructural points of view.</p>
<b>C022</b>	<p><b>Title: Solution processed electrochromic devices</b></p> <p><b>Authors:</b> Haekyoung Kim</p> <p><b>Abstract:</b> Electrochromic devices (ECDs) containing electroactive materials can reversibly change their optical absorbance and transmittance according to applied voltage, and this property is utilized in a variety of applications such as reflective displays, antiglare mirrors, smart windows and sensors. Electrochromic devices (EC), which dynamically change colour under applied potential, are widely studied for use in energy-efficient smart windows. To improve the viability of smart windows, many researchers are utilizing nanomaterials, which can provide electrochromic devices with improved coloration efficiencies, faster switching times, longer cycle lives, and potentially reduced costs. The flexible electrochromic films are promising film for applications in automobiles, buildings, etc.</p>
<b>C025</b>	<p><b>Title: Design of hydraulic bushing and vehicle testing for reducing the judder vibration</b></p> <p><b>Authors:</b> Youngman Kim, Sang Jin Jung, Van-Quyet Nguyen, Van-Quang Nguyen, Kwangsuck Boo and Heungseob Kim</p> <p><b>Abstract:</b> Generally, judder vibration is a low-frequency vibration phenomenon caused by a braking force imbalance that occurs when a vehicle is lightly decelerated within a range of 0.1 to 0.2g at a speed of 120 to 60 km/h. This comes from the change in the brake disk thickness (DTV), which is mainly caused by the side run-out (SRO) and thermal deformation. The adoption of hydro-bushing in the low arm G bushings of the vehicle front suspension has been done in order to provide great damping in a particular frequency range (&lt;20Hz) in order to prevent this judder vibration from being transmitted to the body. The hydro bushing was formulated using a lumped parameter model. The fluid passage between the two chambers was modelling as a nonlinear element such as an orifice, and its important parameters (resistance, compliance) were measured using a simplified experimental setup. The main design parameters are the ratio of the cross-sectional area of the chamber to the fluid passage, the length of the fluid passage, etc., and their optimal design is such that the loss angle is greater than <math>45^\circ</math> in the target frequency range of 10 to 20 Hz. The hydro bushing designed for reducing the judder vibration was prepared for the actual vehicle application test and applied to the actual vehicle test. In this study, the</p>

	<p>proposed hydro bushing was applied to the G bushing of the low arm of the front suspension system of the vehicle. The loss angle of the manufactured hydro bushing was measured using acceleration signals before and after passing through the bushing. The actual vehicle test was performed on the noise dynamometer for the performance analysis of the judder vibration reduction.</p>
C026	<p><b>Title: Geometry modification of helical gear for reduction of static transmission error</b></p> <p><b>Authors:</b> Sangjin Jeong, Jeonghyun Park, Changjun Seo, Kwangsuck Boo, Heungseob Kim</p> <p><b>Abstract:</b> Gear systems are extensively employed in mechanical systems since they allow the transfer of power with a variety of gear ratios. So gears cause the inherent deflections and deformations due to the high pressure which occurs between the meshing teeth when transmit power and results in the transmission error. It is usually assumed that the transmission error and variation of the gear mesh stiffness are the dominant excitation mechanisms. Predicting the static transmission error is a necessary condition to reduce noise radiated from the gear systems. This paper aims to investigate the effect of tooth profile modifications on the transmission error of helical gear. The contact stress analysis was implemented for different roll positions to find out the most critical roll angle in view point of root flank stress. The PPTTE (peak-to-peak of transmission error) is estimated at the roll angles by different loading conditions with two dimensional FEM. The optimal profile modification from the root to the tip is proposed.</p>
C028	<p><b>Title: Extended Application Of Time-Varying Observer For Rigid Rotors Unbalance Estimation During Acceleration</b></p> <p><b>Authors:</b> Xunxing Yu</p> <p><b>Abstract:</b> Unbalance is one of essential problems for modern rotating machines. In this work, an improved time-varying observer is proposed to estimate the unbalance of rigid rotor during acceleration. In order to fitting different speed acceleration laws, the unbalance forces have been included in an new designed augmented states, meanwhile the state space model of rigid rotor has been also developed. The developed state space model is transformed to a canonical transformation and a new designed time-varying observer can be obtained. The estimated unbalances can be directly obtained by using this time-varying observer. This method would be very helpful for active balancing control strategy during acceleration.</p>

C031	<p><b>Title: Effects of Injection Molding Process Conditions on Physical Properties of EPDM Using Design of Experiment Method</b></p> <p><b>Authors:</b> Young Shin Kim; Euy Sik Jeon; Eui Seob Hwang</p> <p><b>Abstract:</b> The process variables such as time and temperature during the EPDM- injection molding not only change the physical properties of the raw material but also affect the insertion and separations forces when a grommet product is molded and mounted on a car body. Using the design of experiments method, the major factors in the injection molding process were considered to analyze their effects on the physical properties of the obtained EPDM materials. Test pieces were prepared under different process conditions, tensile strength and elongation were measured, and their correlation was analyzed.</p>
C032	<p><b>Title: Optimization of Design Parameters of Spiral Spring for Active Headrest Deployment</b></p> <p><b>Authors:</b>Yunsik Yang; Euy Sik Jeon; Dae Ho Park</p> <p><b>Abstract:</b> Several studies have been conducted to prevent neck injury in rear-end collision. The headrest of the seat which suppresses the relative motion of the head and the torso can suppress the extension of the head, thereby alleviating the injury. The active headrest has a mechanism that supports the head by deploying the headrest at the rear-end collision. The spring remains compressed or twisted until a collision signal is generated and the headrest is deployed after the collision signal. Depending on the shape and deployment structure of the spring, a spring design with a high resilience that is acceptable to the headrest is required. In this paper, design parameter of spiral spring suitable for the structure of the developed headrest is selected, prototypes are fabricated, and development parameters such as development time and development distance are checked and optimal design parameters of the spiral spring are derived. The feasibility of the headrest with the designed spiral spring was verified by the finite element analysis.</p>
	<p><b>Title: Electromagnetic Field Simulation in a Microwave Chamber with Multiple Waveguides</b></p> <p><b>Authors:</b> Jaekyung Kim; Euy Sik Jeon</p> <p><b>Abstract:</b> While microwaves have many features and advantages, problems may occur, including non-heating, partial overheating, and fire due to damaged magnetrons caused by reflected waves, when they</p>

<b>C033</b>	<p>are used without a proper understanding of the permittivity of the object to be heated, the electromagnetic field distribution, the matching between the chamber and the waveguide, and the reflected electromagnetic waves. Simulation was performed using the Ansys HFSS tool. Conditions for the uniform electromagnetic field were derived using the distance from the waveguides to the ceramic material as well as the microwave energy intensity as major parameters.</p>
<b>C1003</b>	<p><b>Title: Research on Systematic Design and Installation Based on Explosion Protection Technology Combined with Traction Elevator</b></p> <p><b>Authors:</b> Changming Li, Qibing Wang, Yonggang Leng, Yu Li</p> <p><b>Abstract:</b> According to GB, NEC, ASME17.1, ANSI A10.4 and EN 81.1 standard, there is a danger of explosive gas or dust. And then for elevator explosion protection, we design a device type up to requirements of NEC Class 1, Division 1, Group C&amp;D as well as NEC Class 1, Division 2. It is also a controllable device type working well in highly explosive and hazardous work areas. We keep the GEDA explosion-proof lift fully fixed to protect workers and materials to the maximum extent. In addition, explosion-proof elevators in China must meet the standards of GB3836.1/2, GB50257, GB7588, etc. Combining the engineering practice over the years, the authors put forward in this paper a method of design and development as well as components based on explosion protection combined with traction elevator, which opens a new window for the systematic design and installation optimization of explosion-proof elevator.</p>



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## **NOTE**