2014

Industrial, Systems and Design Engineering & Technology and Engineering Abstracts

Second Annual International Conference on Industrial, Systems and Design Engineering
&
Annual International Conference on Technology and Engineering

23-26 June 2014, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

2nd Annual International Conference on Industrial, Systems and Design Engineering

&

Annual International Conference on Technology and Engineering

23-26 June 2014, Athens, Greece

Edited by Gregory T. Papanikos

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(In Alphabetical Order by Author's Family name)

Preface

This abstract book includes all the abstracts of the papers presented at the 2nd Industrial, Systems and Design Engineering & at the Annual International Conference on Technology and Engineering, 23-26 June 2014, organized by the Athens Institute for Education and Research. In total there were 33 papers and over 35 presenters, coming from 11 different countries (Algeria, Bulgaria, Canada, Germany, Hong Kong, Iraq, Libya, Turkey, UAE, UK, USA). The conference was organized into eight sessions that included areas of Industrial, Systems and Design Engineering, Technology and Engineering and other related fields. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 150 international conferences and has published over 100 books. Academically, the Institute is organized into six research divisions and twenty-seven research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
2nd Annual International Conference on Industrial, Systems and Design Engineering & Annual International Conference on Technology and Engineering, 23-26 June 2014, Athens, Greece
PROGRAM

Conference Venue: Titania Hotel (52 Panepistimiou Avenue)

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1. Dr. Gregory T. Papanikos, President, ATINER.
2. Dr. Theodore Trafalis, Head, Industrial Research Unit, ATINER & Professor of Industrial and Systems Engineering, The University of Oklahoma, USA.
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9. Dr. Thomas Attard, Head, Civil Engineering Research Unit, ATINER & Associate Research Professor, Arizona State University, USA.
10. Dr. Debnath Bhattacharyya, Academic Member, ATINER & Professor, MPCTM, Gwalior, India.
11. Dr. Arthur Pantelides, Academic Member, ATINER & Director of Engineering, Sumitomo Machinery Corporation of America, USA.
12. Dr. Ghazi AL-Khateeb, Associate Professor & Vice Dean of Engineering, Jordan University of Science & Technology, Jordan.
13. Dr. Berna Bridge, Lecturer, Izmir Institute of Technology, Turkey.
14. Dr. Pallab Das, Assistant Professor, National Institute of Technology Silchar, India.
15. Dr. Huseyin Ince, Associate Professor, School of Business Administration, Gebze Institute of Technology Gebze, Kocaeli, Turkey.
16. Dr. Tsutomu Mishina, Professor of Systems Science and Technology, Akita Prefectural University, Japan.
17. Dr. Maher Maalouf, Assistant Professor, Khalifa University, UAE.
18. Dr Budi Santosa, Head of Industrial Computation and Optimization Laboratory, Institute Technology of Sepuluh Nopember , Surabaya, Indonesia.

Administration

Fani Balaska, Stavroula Kiritsi, Eirini Lentzou, Konstantinos Manolidis, Katerina Maraki, Celia Sakka, Konstantinos Spiropoulos & Ioanna Trafali

C O N F E R E N C E P R O G R A M

(The time for each session includes at least 10 minutes coffee break)

Monday 23 June 2014

09:00-09:30 Registration

09:30-10:00 Welcome and Opening Remarks

1. Dr. Gregory T. Papanikos, President, ATINER.
2. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
3. Dr. Nicholas Pappas, Vice-President of Academic Affairs, ATINER & Professor, Sam Houston University, USA.
4. Dr. Theodore Trafalis, Head, Industrial Research Unit, ATINER & Professor of Industrial and Systems Engineering, The University of Oklahoma, USA.

10:00-11:30 Session I: Neural Networks, Modeling and Machine Learning
Chair: George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.

1. Hubertus Franke, Professor, University of Applied Sciences, Germany. Agent Based Environments using Petri-Net-Profiles in Construction Sites.
2. *Dimitrios Zermas, PhD Student, University of Minnesota, USA, Nikolaos Papanikolopoulos, Professor, University of Minnesota, USA & Panagiotis Stanitsas, PhD Student, University of Minnesota, USA. Semi-Autonomous Monitoring of Large Scale Fields Utilizing UAVs.
3. Serafettin Ekinci, Dr., Selcuk University, Turkey, Mustafa Tasyurek, Dr., Selcuk University, Turkey, Humar Kahramanli, Assistant Professor, Selcuk University, Turkey & Kadir Sabanci, Assistant Professor, Batman University, Turkey. Modelling of the Tensile Properties of High Density Polyethylene/Carbon Nanotube Composites via ANN. (Technology).
4. Rafiaa Boujbel, Ph.D. Student, Munich University, Germany. Channel Classification with Hidden Markov Models in Mobile Networks. (Technology)

11:30-13:00 Session II: Manufacturing and Materials
Chair: Dimitrios Zermas, PhD Student, University of Minnesota, USA.

1. *Lee Ostrom, Academic Director and Associate Dean, University of Idaho, USA & Wilhelmsen, Director and Assistant Professor, University of Idaho, USA. Use of and Three-Dimensional Imaging to Inspect Composite Materials.
2. Murat Mirik, Prelector, Cumhuriyet University, Turkey, Mustafa Tasyurek, Dr., Selcuk University, Turkey & Serafettin Ekinci, Dr., Selcuk University, Turkey. Notch Impact Resistances of Carbon Nanotubes Reinforced High Density Polyethylene Nanocomposite Materials. (Technology).
3. Mustafa Tasyurek, Dr., Selcuk University, Turkey, Serafettin Ekinci, Dr., Selcuk University, Turkey & Murat Mirik, Prelector, Cumhuriyet University, Turkey. Investigation of Mechanical Properties of High Density Polyethylene/Carbon Nanotube Composites Manufacturing by the Extrusion Method. (Technology).
4. Jan Erik Heller, Ph.D. Student, RWTH Aachen University, Germany, Manuel Loewer Engineer, RWTH Aachen University, Germany & Joerg Feldhusen, Director, RWTH Aachen University, Germany. Rethinking Morphological Analysis Application for Concept Synthesis in Engineering Design.

5. Joachim Kleylein-Feuerstein, Scientific Assistant, Fraunhofer IPA, Germany, Fabian Joas, Scientific Assistant, Fraunhofer IPA, Germany & Rolf Steinhilper, Professor, University of Bayreuth, Germany. RFID Supported Remanufacturing of ECUs. (Technology).

13:00-14:00 Lunch (details during registration)

14:00-15:30 Session III: Human Factors Facility Layout and Scheduling
Chair: Nicholas Pappas, Vice-President of Academic Affairs, ATINER & Professor, Sam Houston University, USA.

1. *Mohammad Abdoli-Eramaki, Associate Professor, Ryerson University, Canada & Caroline Damecour, Associate Professor, Ryerson University, Canada. Design and Biomechanical Evaluation of Trunk Support Device for Leaning and Reaching Forward Activities.
2. *Zuhair Ahmed, Assistant Professor, Baghdad University, Iraq, Ahmed Ahmed, Assistant Professor, Baghdad University, Iraq & Falah Abdulsada, Lecturer, Baghdad University, Iraq. Optimization of Scheduling through Altering Layout using Pro-Model.

15:30-17:00 Session IV: Routing and Transportation
Chair: Zuhair Ahmed, Assistant Professor, Baghdad University, Iraq.

1. Can Kalayci, Assistant Professor, Pamukkale University, Turkey, Olcay Polat, Research Assistant, Pamukkale University, Turkey & Ozcan Mutlu, Assistant Professor, Pamukkale University, Turkey. The Vehicle Routing Problem with Simultaneous Pickup and Delivery Based on Speed Limit.
2. Erdinc Oner, Assistant Professor, Izmir University, Turkey, Hande Cakın, Research Assistant, Izmir University, Turkey & Deniz Tursel Eliiyi, Associate Professor, Izmir University, Turkey. Optimizing Public Bus Schedules for Izmir Public Transportation System: A Case Study.
3. Leyla Ozgur Polat, M.Sc. Student, Pamukkale University, Turkey, Semih Coskun, Assistant Professor, Pamukkale University, Turkey, Olcay Polat, Res. Assistant, Pamukkale University, Turkey & Askiner Gungor, Professor, Pamukkale University, Turkey. Green Supply Chain Network Design Considering Expectations of Customers and Retailer.
4. Hasan Akyer, Research Assistant, Pamukkale University, Turkey, Ozcan Mutlu, Assistant Professor, Pamukkale University, Turkey &Emrah Korhan, Industrial Engineer, Pamukkale University, Turkey. Determining the Relationship between Breadth of Data and Maturity Time in Stock Market. (Monday, 23 of June, evening session).
5. Olcay Polat, Research Assistant, Pamukkale University, Turkey. Can Berk Kalayci, Assistant Professor, Pamukkale University, Turkey & Hans-Otto Guenther, Professor, Seoul National University, Korea. A Novel Solution Approach for the Feeder Containership Routing Problem. (Monday, 23 of June, Session IV).

21:00–23:00 Greek Night (Details during registration)

Tuesday 24 June 2014

09:00-11:00 Session V: Environmental Applications
Chair: Peter Boehm, Professor, University of Applied Sciences Trier, Germany.

1. Gustavo Escobar-Palafox, Head of Nonconventional Machining, AMRC,University of Sheffield, UK, Amaia Alberdi, Researcher, Tecnalia - Industrial Systems Unit, Spain, Rosemary S Gault, European Project Co-ordinator, AMRC, University of Sheffield, UK & Keith Ridgway, Executive Dean, AMRC, University of Sheffield, UK. Abrasive Recycling in Abrasive Waterjet Machining. (Technology).
2. Pavlina Vodenova, Assistant Professor, University of Forestry, Bulgaria. Environmental Aspects in Designing Spaces and Furniture for Children.
3. Richard Carranza, Consultant/Chemical Engineer, USA. A Review of Process Safety Catastrophes on the Texas Gulf Coast.

11:00-12:30 Session VI: Optimal Design
Chair: Florian Kauf, Professor, Institute of Product Development, Germany.

1. *Peter Boehm, Professor, University of Applied Sciences Trier, Germany. EN 13445 – Unfired Pressure Vessels – Useful for Europe?
2. Antonios Antoniou, Academic Employee, Institute of Applied Materials, Germany. Experimental Determination of the Current Density and Impact Pressure Distributions at the Focal Spot of a TIG Arc.
3. Fabian Joas, Scientific Assistant, Fraunhofer IPA, Germany, Joachim Kleylein-Feuerstein, Scientific Assistant, Fraunhofer IPA, Germany & Rolf Steinhilper, Professor, University of Bayreuth, Germany. Handling the Problem of After-Series Availability of Electronic Assemblies. (Technology).
4. Ziani Slimane, Welding and NDT Research Centre CSC, URASM, Algeria. Uncertainty Evaluation Using Statistical Method. Application to Metal Analysis in X-Ray Fluorescence.

12:30-13:30 Lunch (Details during registration)

13:30-15:00 Session VII: Production and Product Development
Chair: Lee Ostrom, Academic Director and Associate Dean, University of Idaho, USA.

1. *Florian Kauf, Professor, Institute of Product Development, Germany. Modular Product Architecture as Base for Product Development and Optimization.
2. Vinzenz Jeglinsky, Scientific Assistant, University of Applied Sciences Landshut, Germany & Sven Roeren, Dean /Member of Research Community, University of Applied Sciences Landshut, Germany. Appreciation as Major Lever for the Producing Industry in High Cost Countries.
3. Sedat Cereci, Vice-Chancellor, Batman University, Turkey. Relation between Technology and Television Productions. (Technology).

15:00-17:00 Session VIII: General Issues on Technology and Industrial Engineering
Chair: Theodore Trafalis, Head, Industrial Research Unit, ATINER & Professor of Industrial and Systems Engineering, The University of Oklahoma, USA.

1. Cheryl Wilhelmsen, Director and Assistant Professor, University of Idaho, USA. Engineering Outcomes of Grades 10-12 Using Different Pre-Engineering Curriculums: A Case Study.
2. Anees Mohammed, Lecturer, Libya. A Comprehensive Study and Comparative of Two Vector Control Techniques for DFIG in Wind Turbine. (Technology).
3. Yick Tat Tsang, Instructor, City University, Hong Kong. Profitability and its Leading Determinants of Listed Construction Firms in Hong Kong. (Technology).
4. Bouhouche Salah, Director, Welding and NDT Research Centre CSC, URASM, Algeria, Ziani Slimane, Researcher, Welding and NDT Research Centre CSC, URASM, Algeria, Bast Jurgen, HGUM, Institute fur Maschinenbau, Germany. Uncertainty Evaluation and Quality Control Using Monte Carlo Simulation. Application to Mechanical Testing.
5. Desislava Angelova, Assistant Professor, University of Forestry, Bulgaria. Tactics for Stimulating the Creative Search in Conducting Intensive Student Modules (Workshops).
6. Andreas Breitfeld, Assistant, Schmidt-University, Germany, Holger Freyer, Assistant, Schmidt-University, Germany, Pierre Conflant, Assistant, Schmidt-University, Germany, Jens Wulfsberg, Head, Helmut-Schmidt-University, Germany & Rainer Bruns, Head, Helmut-Schmidt-University, Germany. Electrorheological Metalbellow Microdrive for the Application in an Incremental Fluidtronic Feed Unit. (Tuesday 24 of June, afternoon).
7. Mohamed Hassan, Associate Professor, American University of Sharjah, United Arab Emirates, Ayah Abusara, Student, American University of Sharjah, United Arab Emirates & Menatalla Shehab El Din, Student, American University of Sharjah, United Arab Emirates. Video Streaming over Cognitive Radio Networks. (Technology)

17:30-20:30 Urban Walk (Details during registration)

21:00-22:00 Dinner (Details during registration)

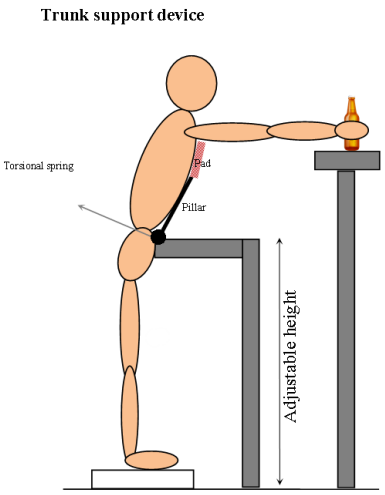
Wednesday 25 June 2014
Cruise: (Details during registration)

Thursday 26 June 2014
Delphi Visit: (Details during registration)

Mohammad Abdoli-Eramaki
Associate Professor, Ryerson University, Canada
&
Caroline Damecour
Associate Professor, Ryerson University, Canada

Design and Biomechanical Evaluation of Trunk Support Device for Leaning and Reaching Forward Activities

Back discomfort, lower extremity loading, and unbalanced positions may inhibit workers from standing for industrial stationary work. An ergonomic aid was developed for workers in manual handling jobs; specifically those employees who work in stationary standing postures where they must bend forward for reaching; for example: sorting on a conveyor belt, washing dishes or assembling a car component. In the first example, workers would normally assume a forward bent posture with many trunk rotational motions and rapid reaching with the hands; and in the second case, the worker must lean forward for extended periods of time using their back muscles to sustain this posture. We have built a new ergonomic aid that has the ability to reduce the back effort required for standing in a forward bent position or reaching to extended distances. The device is called a Dynamic Trunk Leaning Support (DTLS). Two forward-leaning supports were compared to unsupported standing during an extreme reach with 30° trunk flexion under varied light load conditions in the outstretched hands. Eleven males from the university participated (mean age 30 years (SD 5)). Link segment modelling showed a 25-30% reduction in the L4/L5 bilateral hip external moments when using a chest-height support. Ribcage expansion with maximal inspiration remained unchanged with an average 85 N of compression force, and low back discomfort remained tolerable for this difficult



reach. Leaning against a work table had no influence on L4/L5 moments or back discomfort because contact was at the pelvis; the external moment at the hips decreased by 6%. Postural stability was improved with little migration of the centre of pressure under both supports. Only the chest support showed potential to influence work positioning and prevent back injuries; further study is needed on support forces and usability.

Zuhair Ahmed
Assistant Professor, Baghdad University, Iraq
Ahmed Ahmed
Assistant Professor, Baghdad University, Iraq
&
Falah Abdulsada
Lecturer, Baghdad University, Iraq

Optimization of Scheduling through Altering Layout using Pro-Model

This paper presents new layout of a factory using Pro Model simulation by choosing the best layout that give the highest productivity and least work in process . The general problem is to find the best sequence in which jobs pass between the machines which are compatible with the technological constraints and optimal with respect to some performance criterion.The best simulation with Pro Model program, when increasing productivity and reduced work in process by balancing lines of production compared with current layout of factory when productivity increase from 45 products to 180 products through 720 hours.

Hasan Akyer
Research Assistant, Pamukkale University, Turkey
Ozcan Mutlu
Assistant Professor, Pamukkale University, Turkey
&
Emrah Korhan
Industrial Engineer, Pamukkale University, Turkey

Determining the Relationship between Breadth of Data and Maturity Time in Stock Market

Capital management is an area that has gained considerable importance in today's competitive market conditions. Decisions of investment is an important stage both individual and institutional investors for sustainable development in finance. Therefore, portfolio management has gained more importance than the past. Investors want to maximize their returns according to the attitude of investors towards risk. Portfolio of stocks were examined by using a method of Markowitz's mean-variance model.

The purpose of the study is to examine the relationship between breadth of data and maturity time during a portfolio investment stage. These two factors to be answered correctly is quite important for investors in the stock market having a dynamic structure.

In the study, portfolios are constructed of stocks listed in BIST-30 index. As a result, in order to make short-term investments using long-term historical data and to make long-term investments using short-term historical data are observed that a more effective strategy.

Desislava Angelova
Assistant Professor, University of Forestry, Bulgaria

Tactics for Stimulating the Creative Search in Conducting Intensive Student Modules (Workshops)

Design workshops are intensive modules which are increasingly used both in the students' training in design and in conducting various design related events. Their popularity is due mainly to the possibility of breaking the existing stereotypes and achieving a number of original solutions to a certain problem.

Due to the limited time to reach the final solution in the workshops, the proper selection of design methods, aimed at enhancing the rapid generation of many ideas, is essential. The large amount of ideas and their variety are preconditions for the successful accomplishment of the assigned task.

The present article is focused on the different stages of the idea generation phase and the possible tactics for their stimulation. Attention is drawn to the specifics of the design process in the different types of tasks.

The information, presented in this article, is aimed at supporting students and lecturers, taking part in such intensive modules, which are successfully applied in the team work of students from the design specialities.

Antonios Antoniou
Academic Employee, Cologne University of Applied Sciences, Germany
Lars Stein
Senior Researcher, Welding and Joining Institute , RWTH Aachen University, Germany
Uwe Reisgen
Head, Welding and Joining Institute, RWTH Aachen University, Germany
&
Hans-Willi Langenbahn
Dean, Cologne University of Applied Sciences, Germany

Experimental Determination of the Current Density and Impact Pressure Distributions at the Focal Spot of a TIG Arc

Today, the arc processes account for the most significant proportion of the joining of metals in welding technology. Ever new process variants and process combinations of fusion welding are being tested in order to satisfy the more stringent requirements of the production with regard to high productivity with a simultaneous improvement in the quality. The high-performance and hybrid welding processes which have been created in this way permit a high energy density, a high welding speed and a low energy per unit length. The prerequisite for the high productivities of these processes is their automation friendliness. In turn, this can be achieved by high degrees of process stability and reliability during the weld formation. Both characteristics necessitate precise knowledge of the physical processes in the arc region. One of these is the type of energy coupling of the arc to the workpiece. The local energy density on the workpiece surface can be described using the distribution of the current density in the focal spot region of the arc. By redeveloping and utilising a measuring jig, it was possible to scan the current density distribution under a TIG arc experimentally with local resolution for the first time. The initial results show the tomographic reconstruction of the current density distribution three-dimensionally. For this purpose, the corresponding impact pressure profiles are elaborated by taking impact pressure measurements in order to be able to improve the understanding of the connection between the current density and the gas flow. After the

corresponding automation of this analysis method, it should help to optimize the design characteristics of torch concepts for practice in the future.

Peter Boehm
Professor, University of Applied Sciences Trier, Germany

EN 13445 – Unfired Pressure Vessels – Useful for Europe?

Requirements and specifications for pressure vessels are still increasing. More and more different European and National Standards like AD 2000 or BS 5500 have to be used in a parallel way. For a long time the different countries in Europe acted according their national standards and codes on basis of the Pressure Equipment Directive. Since 2003 the DIN 13445 – Unfired pressure vessels – is available and can be used as presumption of conformity. The advantage of this harmonized Standard: clear and common conditions for all countries in Europe. More over pressure vessels, built outside of Europe for the European market, can now be constructed according to only one common Standard. The problem in the past: German customers require German national standard, French customers require French national standard, etc. – a major problem for all producers of unfired pressure vessels word-wide. The EN 13445 was accompanied by a lot of harmonized Standards explaining the Standard in detail. So far – so good. But more than 10 years later there exists only a low demand for the EN 13445. Most of the producers still fabricate according to their national standards. It is strongly suspected that on the one hand the producers still live in their world of their national Standards, on the other hand the 13445 - Standard shows a very complex handling. This paper gives an example how to deal with the 13445 Standard including a comparison to the German AD-rulebook. In doing so a new constructed unfired pressure vessel will be examined according to EN 13445 part No. 5 – Inspection and testing -. Hereby the use of Non-Destructive Testing Methods will be explained. Parallel to that a guideline or recipe will be presented to understand the procedure within the Standard. At least a comparison to German AD-rulebook shows the differences and gives an overview how to deal with both procedures.

Rafiaa Boujbel
PhD Student, Munich University of Applied Sciences, Germany

Channel Classification with Hidden Markov Models in Mobile Networks

In telecommunication networks, Key Performance Indicator (KPI) is monitored to ensure the connection quality to the users by the operator.

Many indicators are provided by the network equipment in order to ensure a higher Quality of Service (QoS) in communication networks. With the significant increase in growth of data traffic on the mobile network, a detailed analysis of the transmission quality is becoming increasingly important.

The aim of this work is to develop a channel estimation tool that is able to determine transmission channel characteristics in mobile radio receivers. The role of this tool is to give the final user an estimation of the quality and the characteristics of the transmission channel in order to assure a good use of the channel in mobile networks.

This channel classification is based on a hidden Markov models (HMMs) which are widely used and accepted in the field of digital communication.

In a central network unit, test packets are created and sent. In the mobile radio channel, the signals are disrupted and delayed, depending on the characteristics of the channel. From the received signal, sequence errors are generated from 1 in the case of error and 0 in the case of error-free.

Including stored channel models in a database, the channel is automatically classified via channel estimation. This channel estimation consists of a metric named Kullback-Lieber Distance (KLD) used to calculate the similarity between models. The KLD algorithm is used to measure the distance between sequence errors generated and each HMM stored in the channel models in the database. The smallest absolute distance is considered and the model is classified in the channel that corresponds to the smallest distance. The output of the KLD algorithm is sent back as a result to the central network unit.

Andreas Breitfeld
Assistant, Schmidt-University / University of the German Federal Armed Forces Hamburg, Germany
Holger Freyer
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&
Rainer Bruns
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Electrorheological Metalbellow Microdrive for the Application in an Incremental Fluidtronic Feed Unit

At present micro parts are produced using micro machine tools able to hold tight positional and form tolerances. Big machines are used for these processes to work elements and structures in sub-millimeter range. The production of these machine tools requires high energy and resources, ergo high investments costs. Furthermore high expenses in maintenance, high standards for infrastructure incur in operation. The compensation of disadvantageous properties is often achieved by the manufacturers at the cost of increasing the complexity of the machine. Thus great masses relative to the work piece are moved. Since 2005, a new and revolutionary modular machine tool concept, which minimizes the machine part, reduces the complexity of the overall system and in that way drastically cuts down the machine's cost is being developed at the University of the German Federal Armed Forces Hamburg. This concept is called Square Foot Manufacturing (SFM). One main principle of SFM can be seen in the application of new construction principles with a focus on Meso-MEMS scaled moduls as well as the widespread use of fast and flexible production technologies, such as 3D-printing. One of the Meso-MEMS scaled modules presently being in development is an electrorheological metalbellow microdrive

(Fig. 2) for the powering of an incremental fluidtronic feed unit (Fig. 1). This linear actuator consists of a 2 –way electrorheological micro-valve acting as the actuator's controller, which itself is integrated in a metal bellow, which acts as the fluidtronical plant, transforming the fluid energy of the hydraulic system into mechanical force. The hydraulic actuator is operated by an electrorheological fluid, which viscosity can be controlled by changing the parameters of an electric field in the valves. Due to its integrated new design, the actuator has no moving parts, such as pistons or cylinders, which make it highly reliable, very precise and easy to produce. Furthermore this "Smart Hydraulics"-actuator is suitable for clean-room production conditions, since there are no oil-leakages such as in conventional hydraulic-cylinder solutions.

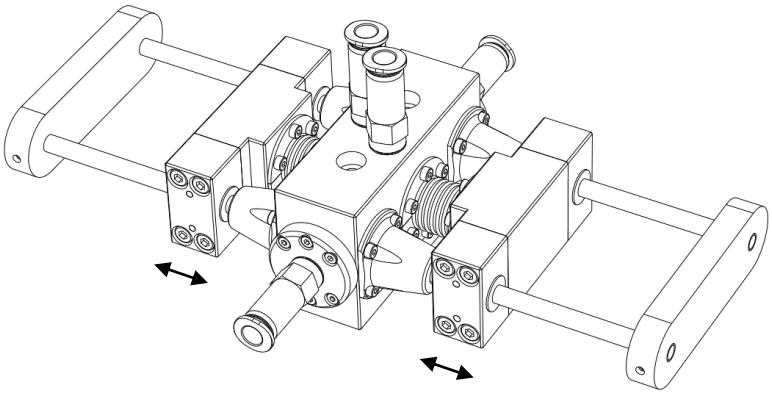

Fig.1: Incremental fluidtronic feed unit for SFM (overall length: 200 mm)

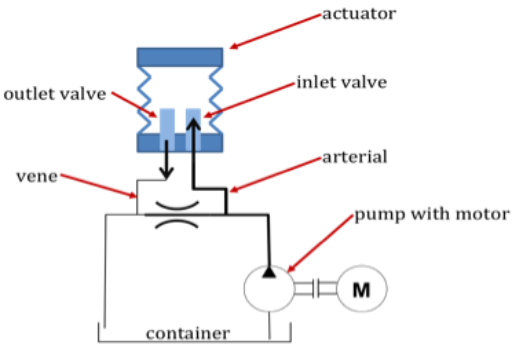

Fig. 2: Electrorheological metalbellow microdrive (actuator size: 20 x 15 mm)

Richard Carranza
Consultant /Chemical Engineer, USA

A Review of Process Safety Catastrophes on the Texas Gulf Coast

Catastrophes related to processing facilities on the Texas Gulf Coast are reviewed. Most information is taken from the Chemical Safety and Hazard Investigation Board (CSB). The cases are condensed and presented such that only the essential material required for understanding the event is included. The Board's recommendations are highlighted. Statistics are presented from the Bureau of Labor Statistics and the Bureau of Economic Analysis indicating the rates of injuries and deaths in the industry. Furthermore, personal observations are made which include commentary based on the author's 25 years of industry experience.

Sedat Cereci
Professor, University of Batman, Turkey

Relation between Technology and Television Productions

Technology presented people many facilities to communicate and for entertainment. Television is the most attractive media of 21. century and assembling is the base of television productions. Television constitutes enormous fantacy worlds and takes the spectator to its fantastic world by its artifical attractions. Spectators are affected by attractions of images which are revealed by technichs of assembling in a film or a in television production. Technology is the most enormous component of 21.th century and most of people can not avoid technology because of their businesses or because of their life styles. Computer is an unavoidable part of many people's lives and computer is used a miraculous device in the world. Contemporary computer technichs present television producers and to directors many facilities to assemble different images by the help of attactive technics of computer. Assembling is a kind of magic because of associating different images in a fantastic story and it provides the spectators to travell to a fictional world. Computer technics help this travell and ease to emerge a rationalist story from a fantastic story. Television productions sometimes use special shootings and these shootings include difficulties to apply. But contemporary computer technics help difficulties to apply them and affect people as they want to live in those fantastic images. Computer technology adoptes many attractive artifices and help television productions by revealing colorful attractions for television spectators.

Serafettin Ekinci
Dr., Selcuk University, Turkey
Mustafa Tasyurek
Dr., Selcuk University, Turkey
Humar Kahramanli
Assistant Professor, Selcuk University, Turkey
&
Kadir Sabanci
Assistant Professor, Batman University, Turkey

Modelling of the Tensile Properties of High Density Polyethylene/Carbon Nanotube Composites via ANN

For the attempts in order to enhance mechanical properties of the composite materials, carbon-nanotubes (CNTs) have been used with polymers from the date of their introduction to make composites having better properties. Polyethylene (PE) multiwalled carbon nanotubes (MWCNTs) with weight fractions 1, 3, 5 wt% were prepared by melt blending using a twin screw extruder. Multi-wall carbon nanotube (MWNT) /HDPE composite were fabricated using the injection technique as tensile test bar. Tensile tests were performed by universal tensile testing device according to ASTM D 638 test standards. The four different Artificial Neural Network (ANN) models have been designed to predict the maximum load, elongation at break and maximum stress. To evaluate the success of systems various statistical measures such as MAE, RMSE and R2 have been used. The results show that the ANN model trained using Levenberg–Marquardt (LM) algorithm has produced more accurate results.

Gustavo Escobar-Palafox
Head, University of Sheffield, UK
Amaia Alberdi
Researcher, Tecnalia - Industrial Systems Unit, Spain
Rosemary Gault
European Project Co-ordinator, AMRC, University of Sheffield, UK
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Abrasive Recycling in Abrasive Waterjet Machining

Abrasive Waterjet Machining (AWJ) is a non-conventional materials processing technology that has gained popularity in machining engineering materials such as aerospace alloys and composite materials. In AWJ, abrasive is added to a high velocity water jet, which impacts into the workpiece removing material in an accelerated erosion process. AWJ has many advantages over conventional machining processes as it does not produce a heat affected zone, produces low machining forces, is a cleaner technology and has low processing costs.

A breakdown of process costs has demonstrated that abrasive accounts for 60% of total machining cost. Moreover, production of abrasive by stripping extremely large quantities of sand poses an environmental impact that could affect ecosystems. Abrasive recycling systems exist in the market and could further reduce economic process costs and environmental impact; however the effect of recycling abrasive on cutting power and quality has not been investigated. This article reports on experiments that were carried out, as part of the European-funded REFORM project, in order to characterise the effect of recycling abrasive in terms of morphology, machinability and surface quality characteristics (surface roughness and taper angle). A fractional factorial experimental design was performed with the aim of comparing the performance of recycled abrasive against 'as new'.

The results showed a changed in abrasive morphology and cutting performance.

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Video Streaming over Cognitive Radio Networks

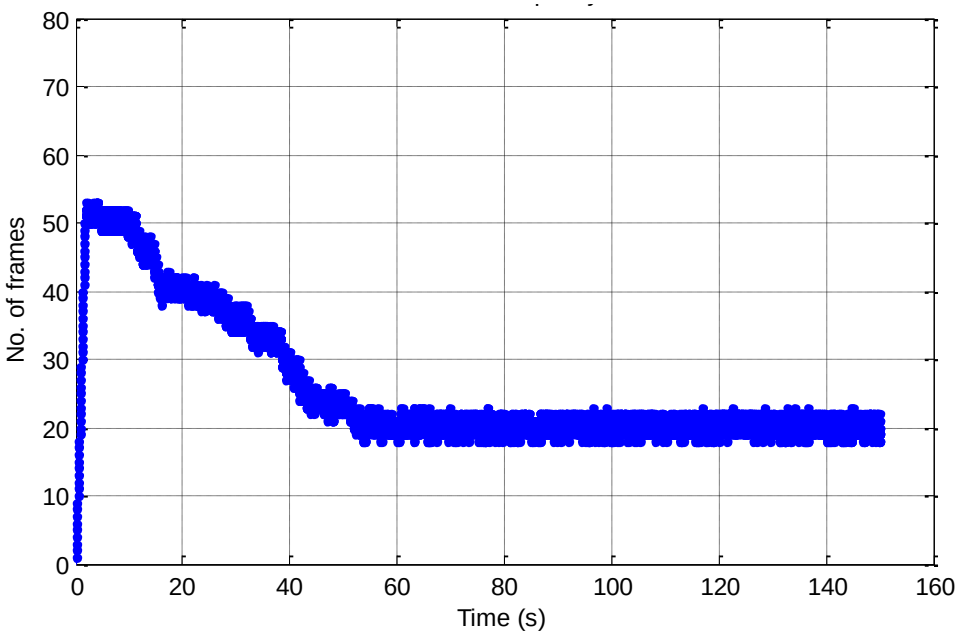
Cognitive radio is a promising technology that is widely recognized as the solution for the spectrum scarcity problem [1]. In cognitive radio systems (CRS), non-license holders are allowed to temporarily utilize certain frequency bands when they are not occupied by their primary users (PU) [2]. However, the spectrum must be immediately vacated when demanded by its primary user. This requires the relocation of secondary users (SU) using the channel to other available channels, if any. Clearly, such an act introduces transmission delays that could be very severe if there are no available channels at that moment of relocation or for some consecutive periods of time. In this paper, we investigate a major challenge to cognitive radio networks, namely the randomness in the channel availability for secondary users as imposed by the random behavior of primary users. Then, we study the impact of such randomness on video streaming over cognitive radio systems.

When video is streamed over cognitive networks, allocation of secondary users to available channels is not the only challenge. Other challenges stem from the strict quality of service requirements mandated by the video streams. Video applications are time-sensitive and bandwidth-hungry applications that are intolerable to losses and delay variations. Therefore, the conditions of the channel granted to the SUs have a major impact on the streaming process. In more details, the unreliability of wireless channels can cause unexpected variations in the number of correctly received and decoded video frames in the playback buffer. When such a number of correctly received and decoded video frames is less than the number of played frames at any interval of time, the playback buffer will starve. This will ultimately lead to interrupted video playback.

This paper investigates the problem of video transmission over cognitive radio networks with the objective of maintaining continuous

video playback with graceful degradation of the quality of reconstructed video sequences. A Markov chain model for the channels' availability in an m-channels system is developed. This model is used to estimate the likelihood of transmission interruptions secondary users might experience due to the loss of a used channel to a primary user. In addition, a hybrid solution that jointly integrates rate control and adaptive playback is proposed to overcome possible starvation instants at the playback buffer.

A matlab based simulation model is used to simulate a cognitive radio system with a number primary and secondary users. A video file is streamed from a transmitter to a cognitive radio user. Transmission and network delays were taken into account. The availability of each channel is modeled by a Markov chain with different parameters. The quality of received video is controlled according to the occupancy of the playback buffer at the receiver. This is achieved using two possible techniques, namely, rate control and adaptive playback. The following figure shows the achieved receiver buffer occupancy using rate control and adaptive playback. The figure shows that the buffer never starved and hence the goal of continuous video playback is achieved.



Receiver buffer occupancy.

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Rethinking Morphological Analysis Application for Concept Synthesis in Engineering Design

In a globalised world, enterprises are forced to deal with challenging market conditions. As customers' demand for individualised products increases and design processes have to be both faster and cost efficient, engineering departments are forced to bring up new approaches to remain competitive. Hence, systematic innovation is vital for entrepreneurial success.

One way to address concept generation is the analysis of main functions and their division into sub functions, for each of which several principle solutions can be designed or taken from catalogues. Those individual solutions can be combined to obtain overall solutions, a step usually conducted with morphological boxes. Although widely published, this method is not well-established in industrial application and often misused in academia: the method does not prevent bad decisions and is often utilised to justify solutions of the operator. Moreover, the vast number of possible overall solutions resulting from combinatorial explosion is still not manageable.

The paper conducts an extensive literature review to understand the initial aim of morphological analyses and existing optimisation approaches. Two contradicting directions can be observed: the search for solutions either towards innovation potential or towards technical feasibility. Both come with drawbacks: the first sacrifices realisation potential by spanning large solution fields with rather abstract entries. The seconds supports automated concept synthesis, however, sacrifices innovation due to choosing comparatively concrete entries.

To overcome these shortages, a new method is presented intending to support engineers. It is founded on the hypothesis that taking context information into account reduces the overall effort. This leads to an assisted approach with gradually substantiating applications of low-

complexity morphological boxes. In addition to that, mathematical concepts like Pareto efficiency are integrated to optimise the multiplicity resulting from combination. An accompanying software tool is presented.

The paper concludes with the discussion of both method and tool in an application example for next generation machine tool concept elaboration.

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Agent Based Environments Using Petri-Net-Profiles in Construction Sites

A Petri-Net is a bipartite graph consisting of nodes called places (visualized by circles) and transitions (visualized by squares). Places can contain marks which indicate the Petri-Net states. The states can change when a transition "fires". "Fire" means that places which are predecessors of the transition lose marks and successors receive marks. An Agent is an entity that can act autonomously, communicate with other Agents and whose actions follow certain intentions. Agents organized in Multi-Agent Systems (MAS) solve problems in a distributed way and can easily be adjusted by adding new Agents. Multi Agent Systems (MAS) require a good environment description. Petri-Nets can be used to describe the complex environment of a MAS because they can model both 'non-deterministic' and the asynchronous situations. Petri-Nets often produce non-deterministic decision problems because the marks decide randomly where to go if they have several possibilities for firing. Also it is not possible to give certain marks privileges. We avoid this problem by using semi-intelligent Agents which control the mark flow and solve non-deterministic situations. In this way MAS could use the Petri-Net to make a decision in its complex environment.

To model the behaviour of MAS, Petri-Nets should be extended with new elements like special elements for "Agent Communication". Here "Agent-Communication" could be integrated in Petri-Nets and could be realized by a new visualisation model. A possible application for this model could be a decision-support-system in logistics, especially in construction sites realized with smartphones. Smartphones are well suited, because they are small and mobile, can be used as a telephone, and have an integrated computer. Here smartphones could be Agents that control a logistics scenario in construction sites where the logistics environment is modelled by Petri-Nets. Nevertheless, the last decisions will be done by humans with the support of smartphones. In this construction scenario, smartphones could be the Agents in a MAS. MAS recognize their environment through Petri-Net profiles.

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Appreciation as Major Lever for the Producing Industry in High Cost Countries

Production in high cost countries differ in various aspects from production in low cost countries. For example, the industry in the southern part of Germany, described by a high density of global player´s primary plants, is faced with certain challenges. One of the most outstanding aspects is given by the searching and keeping of talented and high qualified employees. In the last years it becomes more and more apparent that money cannot solve the challenge of availability and raising loyalty of current and further staff.

In this paper, three approaches of companies' reaction on this given situation are described and discussed. The conflicts between objectives of the producing industry and the needs of the single employees are taken into account. Therefore, certain measurements are argued by their effects on efficiency, delivery times, and product quality.

The measurements include aspects of change and innovation management in both fields – organizational and technical. Examples for such measurements are an optimization of shift management and the integration of a low hierarchy in production plants. They have major impacts on the employee´s motivation. But, as the authors will disclose, more and more companies see the way of daily interaction with the employees by substantial appreciation as an enormous source of an effect on the motivation. This effect can be transferred into the key performance indicators (KPI) for whole plants and business units in producing industry.

Several disciplines and methods have been developed in the last nearly hundred years to demonstrate the effects of motivated staff on an enterprise´ result. This paper validates theories and adds experiences of companies, producing in a high cost country as well as in an area with very low availability of qualified employees in a southern part of Germany.

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Handling the Problem of After-Series Availability of Electronic Assemblies

Globalization and the need for individual systems lead to growing complexity, a rising number of diversity and shortened lifecycles of electronic assemblies. For example, the number of electronic assemblies used in products of the automotive and automation industry increases every year. Many installed electronic components are already not available any more five years after the end of production. If they are available, the price is a multiple of its original.

Numerous problems arise for producers and costumers of these products. For example, often it is not possible to repair an electronic assembly because of obsolete components. That is why producers of electronic assemblies have to do expensive redesigns to support these for a long time. At the moment there are neither economic nor sustainable solutions for the problem of after-series availability of electronic assemblies. Five possible strategies to handle the problem are: Long-time-storage, remanufacturing, reverse engineering, reliable engineering and obsolescence management for electronic assemblies. To provide the applicability of these strategies the cooperation-network E-NV was established as an association of different companies and research institutions. Within the network, diverse competences to create solutions for electronic after-series availability are bundled. The main objective is to obtain innovative, economic and practicable solutions for extending the lifecycle of electronic assemblies. This is expected to lead to standardized processes for producers and costumers. Furthermore, new products and services can be created to solve occurring obstacles in after-series availability fast and efficient.

Because of the facts mentioned at the beginning, the problem of after-series availability is expected to increase in the future. The solutions to be presented by the cooperation-network E-NV could help companies

in different sections, not only in the automotive and automation industry, to deal with this problem.

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The Vehicle Routing Problem with Simultaneous Pickup and Delivery Based on Speed Limit

Vehicle routing problem with simultaneous pickup and delivery (VRPSPD) is a variant of vehicle routing problem (VRP) which is a well-known, NP-hard combinatorial optimization problem encountered in many transport logistics and distribution systems. In VRPSPD, clients demand both delivery and pickup operations, thus, the load of the vehicle and vehicle capacity become critical elements of the problem in order to create a feasible solution. VRPSPD assumes that speed of vehicles on each route are identical. However, in practical situations, average speed limits of routes differ. For a more realistic scenario, in this study, VRPSPD is generalized to vehicle routing problem with simultaneous pickup and delivery with speed limit (VRPSPDSL). The VRPSPDSL is based on different average speed limits of different routes that significantly increases the practicality of VRPSPD. In such a problem, the transportation requests have to be performed by vehicles as early as possible. The goal is to minimize the total travel duration of vehicles' considering the average speed limits of different routes of a network. A new mathematical formulation for VRPSPDSL is introduced and computational results are reported on small test instances. Since VRPSPDSL is NP-hard, efficient search methodologies needs to be employed to attain (near) optimal conditions.

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Modular Product Architecture as Base for Product Development and Optimization

Regarding to costs 70 – 80 % of the future product are fixed in the early phase of the product devleopment process. You will find similar values if you look to quality. So the biggest challenges in industrial development processes are to reach the though time and cost targets and to handle the increasing number of product variances. This article is about how to develop products (with a special focus on mechatronic systems) that have a high external variance (customer related) but low internal variance (relevant for the development and production). The base for this optimisation is the product architecture starting with the requirements (internal and external), deriving product functions and solution concepts and realising it with concrete components (hardware and software components). Some of the components are variant so the modular product architecture has to be optimized in that way that variance occures late in the production (postponement strategy) or that this variance does not affect the production process (process communality). To optimize these product architectures (not at the «end» in the sense of production but within the product development) variant drivers and design parameters must be identified and than could be optimized e.g. by analysing the impact on development or production effort. Especially for mechatronic systems the consideration of the functional structure offers the base for improvement.

A method will be presented that describes the concrete approach that is becoming more and more evident looking e.g. to mechatronic systems with a high level of functions integrated and distributed all over the different components of the product. Publications of the author are e.g. in the latest version of the famous Pahl/Beitz «Engineering Design, A Systematic Approach» in German that will be translated soon into English.

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RFID Supported Remanufacturing of ECUs

Most mechatronic devices include at least one electronic control unit (ECU). These ECUs provide different functionalities of the controlled assembly by their embedded software. For example, modern premium class vehicles containup to 80 ECUs. Remanufacturing these ECUs saves both costs and resources.

Remanufacturing has been found to be the highest form of recycling. It is characterized by maintaining the current added value of the product in six process steps (initial diagnosis, disassembly, cleaning, inspection, reconditioning and reassembly). Currently the initial diagnosis of ECUs is the biggest challenge. Existing processes are not providing information about the status of the installed electronics. It is thus necessary to explore convenient diagnostic procedures in order to enable a profitable remanufacturing of ECUs. As a solution, the recently developed wireless (service-) interface RFCo (Radio Frequency Communication) shall be applied in future ECUs. RFCo consist of a Radio Frequency Identification (RFID) tag, an additional memory and an serial interface, which is directly connected to the microcontroller of the ECU. Amongst others with RFCo, it will be possible to read out specific production and operating data of the ECU. Even if the ECU is packed and without power supply. These data can then be stored in the memory of the RFCo interface. Therefore, it is possible to get a quick andeasily gained overview ofthe status of the electronics installed. Consequently, by applying the six process steps, remanufacturing companies can guarantee ECUs in mint condition.

In summary, using the RFCo interface helps remanufacturing companies to diagnose the status of the installed electronics. A faster and easier diagnosis as well as an optimized testing procedure will enable companies to profit of ECU remanufacturing economically. Thereby these companies can extend their product portfolios significantly.

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Notch Impact Resistances of Carbon Nanotubes Reinforced High Density Polyethylene Nanocomposite Materials

In this study, Multiwall Carbon Nanotubes (MWNT) reinforced High Density Polyethylene (HDPE) materials were used. Mechanical properties of the samples reinforced with Carbon Nanotubes at weight ratios of 1%, 3% and 5% were investigated. Reinforced samples were compared to samples produced with pure High density Polyethylene. Two different methods were used for sample production. The first method is cutting samples from plates that were produced by hot hydraulic compression. Other one is plastic injection method in a hot mold. The samples were then subjected to experiments and impact resistance values were measured in accordance with ASTM D6110 standards. Also Thermogravimetric Analyses (TGA) was performed for and Multi-Wall Carbon Nanotubes within the High Density Polyethylene. At the end of the study, it was observed that impact resistance decreased with increasing carbon nanotube reinforcement amount. Impact resistance of samples produced by means of plastic injection was improved by 35% comparing with samples produced from pure YYPE. Impact resistance of samples produced by means of hot compression, in the other hand, was decreased by 51%. These results were explained with the fact that structures of composite materials were transformed to a tougher and fragile phase. In the TGA investigations, it was seen that mass loss breakdown temperature and melting point temperature increased by MWNT ratio in the composite samples.

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A Comprehensive Study and Comparative of Two Vector Control Techniques for DFIG in Wind Turbine

The world is facing a situation of the increase in electricity consumption, which resulted in an increase in demand of electric power generating. Therefore, in addition to the traditional electric power plants there are many solar power and wind stations have been installed in the power system for environmentally and economically reasons. In fact, wind energy is the less cost and safest among all sources of renewable energy, it has been recognized that variable speed wind turbine based on the doubly-fed induction generator is the most effective with less cost and high power yield. Therefore, this paper has chosen doubly-fed induction generator in wind turbine for a comprehensive study of modelling, analyzing and control, it is a form of wound rotor induction machine but its rotor windings are connected to the grid through PWM back-to-back converter. DFIG in wind turbine has to operate in different speed, which requires smooth transition mode change for reliable operation. Furthermore, its output electric power has to be controlled to provide stability for the power system; hence its performance depends on the generator its self and the converter control system (rotor-side controller and grid-side controller). This paper present completed mathematical model of DFIG with its AC/DC/AC converter that driven by DC machine. A new design of vector control technique is presented and modelled, it has been designed to use the same feedback PI control loops but different in the compensating parts. However, the control ability to change from one orientation frame to another is based on the estimation of orientation angle which allows to compare and evaluate the two traditional stator-voltage and stator flux oriented frames as well as to investigate and analyze the dynamic performance of the controller. The simulation results demonstrate the accuracy and high performance of the new control system of DFIG for wind turbine and the rotor side controller is more accurate and effective with the fast response under flux oriented frame control while the grid side converter control is more accurate under voltage oriented control.

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Optimizing Public Bus Schedules for Izmir Public Transportation System: A Case Study

In this study, three different public bus lines are investigated to minimize social costs and operation costs through planning efficient schedules for the buses. The bus schedules are planned by the public transportation bus company based on: passenger demand (population of the region, existence of business centers etc.), length and travelling time of route, type of bus (capacity of the bus), and recorded data of number of passengers. However, the company has difficulties in meeting the planned schedules due to the traffic conditions (especially the effects of the rush hour traffic). The time difference between the planned schedules and the actual schedules results in additional cost to both the passengers and the company.

A macroscopic traffic simulation model is developed for three bus lines using actual traffic information (number of buses, number of passengers, travel time, etc.) provided by the bus company. The passenger data for the three bus lines, each having nearly forty bus stops, are analyzed and the passenger inter-arrival time distributions for each bus stop are developed. The simulation model is run with the schedules developed by the public bus transportation company and then with the newly developed schedules considering the effects of the traffic congestion during rush hours. The results and the comparison of different schedules and their effects on travel and waiting times of passengers and operational and social costs to the bus company are discussed.

This study provides a tool for analyzing the time gap between expected and real arrival time of buses for the public transportation system under heavy traffic conditions. The model can be used to simulate different schedules for buses and analyze their effects on the

social cost of passengers and the operational cost of the bus company before making any changes.

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Use of LIDAR and Three-Dimensional Imaging to Inspect Composite Materials

The Boeing Commercial Aircraft Company's 787 is the first commercial airliner with a large number of its structural components made of composite material. The Airbus A350 will follow by 2014. Composites have great advantages as a material of construction for aircraft. It has a high strength to weight ratio and the resulting aircraft weighs significantly less, producing a fuel savings. Composite materials have been associated with aircraft accidents as well. For instance, in the accident involving American Airlines Flight 587 the tail fin of an Airbus A300-605R came off the aircraft after takeoff from JFK Airport. Visual inspection is the primary means of detecting composite damage. However, in remote locations in the world where commercial airliners fly there might not be trained inspectors who can adequately inspect composite structure for damage. In this paper we discuss how we used LIDAR scans of a composite test article projected in a three (3) dimensional, immersive environment to determine whether we could see surface damage. Our proof of concept experiment showed that we could see all the damage we had inflicted on the part, along with some of the existing damage on the test article. The combination of the two technologies, LIDAR and three (3) dimensional, immersive environments, have great promise in providing means to visually inspect composite materials under a variety of conditions.

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Green Supply Chain Network Design Considering Expectations of Customers and Retailer

Most of the recent academic studies claim that there is a strong and growing preference of customers for green products, but practical studies shows otherwise. There is no rise in the percentage of green customers who would like to pay more for green products. In fact, the rise is in the number of conflicted customers who demand green products with the same or lower price. Moreover, the percentage of red customers who do not care about green products significantly increased. Therefore, there is a need in customer segmentation according to green expectations of different customer groups. The problem considered in this study redesigns supplier networks based on green expectation of customer segments and general expectations of retailer from the suppliers including producers, transporters and distribution centers. The problem is modeled using goal programming approach to concurrently satisfy several goals relevant to decision-making situation. The proposed model aims to maximize total utility from the network assuring meet of accurate product with accurate customer which satisfies expectations of customers, retailers and network restrictions. The calculated total utility includes the total income, total cost, total market penalty, total market bonus and total lost sales. The numerical results of the proposed model are presented for a sample model of randomly generated green supply chain network design in order to prove the assets of the problem. As a result, the study shows that expectations of different customers should definitely be considered in designing green supply chain networks.

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A Novel Solution Approach for the Feeder Containership Routing Problem

Feeder containerships are vessels of small or medium size which collect and deliver containers between regional ports and a central hub port which is linked to the main global maritime sea routes. This kind of service is vital in regions which are too remote or face too little cargo volume to be included in long-haul shipping lines. The feeder containership routing problem determines a network of feeder containership routes starting and finishing at a hub port considering time deadlines for servicing all feeder ports such that the total voyage time of all vessels in the heterogeneous fleet is minimized. For this problem, we propose a mixed integer mathematical optimization model and an adaptive search approach combined with construction, improvement and perturbation heuristics. The proposed approach has been tested using a set of randomly generated test instances and a real case study from the Aegean Islands. Moreover, a number of scenarios and sensitivity analyses have been evaluated in order to test the robustness of the proposed approach. Results of the numerical studies show that the developed algorithm produces high quality solutions for the investigated feedership routing problem.

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Uncertainty Evaluation and Quality Control Using Monte Carlo Simulation. Application to Mechanical Testing

Monte Carlo Simulation is a stochastic method that computes the statistical properties of the considered states such as the probability distribution function (PDF) according to the initial state and the target distribution of the inputs variables. All influencing variables are taken into account by a physical model. Conventional approach is generally based on the Guide of Uncertainty Measurement (GUM), the uncertainty budget is established for some parameters such as elongation and stress in mechanical testing of steel. A comparative study between the conventional procedure and the proposed method is given. This kind of approaches is applied for constructing an accurate computing procedure of uncertainty measurement.

A method based on the computed uncertainties is proposed for quality control and conformity declaration according to the existing standards, a quality control monitoring using secondary reference material is also presented.

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Uncertainty Evaluation using Statistical Method. Application to Metal Analysis in X-Ray Fluorescence

In X-Ray Fluorescence uncertainty evaluation of metal analysis is of the great importance particularly in the case of laboratory accreditation. In this work, we present a statistical method based on the repeatability and reproducibility analysis using Certified Reference Material. The main factors influencing the metal analysis results are identified and quantified; this approach assumes a conformity assessment to the accreditation standard ISO/ CEI 17025.

A real evaluation of uncertainty is obtained by developing and application of statistical methods extended to Guide of Uncertainty Measurement (GUM) and other references. The computed uncertainty is useful for product quality and conformity declaration according to the used standard.

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Investigation of Mechanical Properties of High Density Polyethylene / Carbon Nanotube Composites Manufacturing by the Extrusion Method

In this study mechanical properties of multiwalled carbon nanotubes/high density polyethylene (MWCNT/HDPE) nanocomposite materials that produced by the method of injection molding has been investigated experimentally. Multi-walled carbon nanotubes (MWNTs) were incorporated into a high-density polyethylene (HDPE) matrix through using twin screw extrusion and injection technique. High density polyethylene reinforced with different percentages (1%, 3% and 5%) of carbon nanotubes produced and tested as tensile test bar. Tensile tests were performed according to ASTM D 638 test standards. The tensile strength increase given by carbon nanotube reinforcement was examined in tests and furthermore discussed ductility effect too. After the experiments, mechanism changes in surface images from the fracture surface were examined. The reasons of increase in percent elongation and strength of CNT-reinforced composite samples supported by SEM images were explained. Experiments were carried out to be 3 replications. It can be said that minimum percentage of carbon nanotubes reinforcement should be between 1% - 3%.

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Profitability and Its Leading Determinants of Listed Construction Firms in Hong Kong

It is well recognized that construction business is sensitive to the fluctuation of its business environment. Measurement of financial performance of a firm serves the basis of monitoring and evaluating its corporate competence in reacting to environmental change. This research involved applications of quantitative modeling by using various statistical techniques. The financial performance expressed in terms profitability was approximated by factor analysis based on the published financial data of publicly listed construction contractors in Hong Kong between 1992 and 2010. A number of leading socio-economic and sectoral indicators of the general profitability performance of these construction contractors were further identified by means of cross-correction analysis. The empirical result reaffirmed that both macroeconomic condition and construction market demand have a positive leading effect on the Profitability of the construction contractors in Hong Kong.

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Environmental Aspects in Designing Spaces and Furniture for Children

The conception of ecology, the use of ecological materials for an eco home and smart designing of less harmful products which sustain high quality of living have recently become an essential part of the children's interior spaces. The main goal is to minimize the harmful effect over the environment and to improve the relationship between man and nature.

The development of our consumer society has led to the arising of many questions concerning the ecology of the materials, their impact over the environment and their recycling possibilities. The last are crucial for the progress of our world and they can no longer be neglected. What is more, the ecological requirements in the industry have become as important as the ones concerning the quality, the functionality, the ergonomics, the esthetics, the safety of the product etc. The European Union's requirements and directives give shape to the ecological aspect of the industrial production as one of the main factors professionals should consider.

All of the above contributes to environmental furniture and products to become extremely fashionable in the new millennium, and gives rise to a separate branch of design called ecodesign. Ecodesign, also known as "green design ", " sustainable design ", " design for environment" in its nature is the design of products and services that comply with the principles of sustainable development - achieving a balance between economic and social goals and environment.

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Engineering Outcomes of Grades 10-12 using Different Pre-Engineering Curriculums: A Case Study

Research in technology education has identified curricula and content for teaching engineering design programs at the high school level (Bottoms & Anthony, 2005; Rhodes & Childress, 2010; Gattie & Wicklein, 2007; Smith & Wicklein, 2007; Asunda & Hill, 2007; "Engineering by Design," 2007). There are several curriculums at the high school level that teach engineering design using pedagogical approaches that range from problem-based to experiential and inquiry-based learning. What is noticeably lacking, however, is a common instrument that can assess engineering design process and outcome despite the curriculum that is in use.

The purpose of the study was to identify the important constructs and their key indicators that are to be included in the development of an instrument to measure the engineering design process and outcome of students in grades 10-12 that use Project Lead The Way and Engineering by Design curriculums.

The following research questions guided the study: What are the important constructs and their key indicators that are necessary to measure the engineering design process? What are the important constructs and their key indicators that are necessary to measure engineering design outcome? Are there inconsistencies between constructs for design product and process as identified in the Project Lead The Way and Engineering by Design content?

Technology education is not new and has been taught for generations. However, according to the National Assessment of Education Progress (NAEP) (2012, p. ix) "There are currently no standardized, nationally representative assessments to provide evidence of what students know about technology and engineering; the roles they play in our lives; and the extent to which students can use technologies and understand how engineers design and develop them." Determining the important constructs of pre-engineering/technology is a major step towards consistency in curricula development and crucial

for developing an assessment tool for validating pre-engineering outcomes in high school pre-engineering courses.

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Semi-Autonomous Monitoring of Large Scale Fields Utilizing UAVs

In the present work, we demonstrate a novel concept for monitoring large scale crop fields utilizing Unmanned Aerial Vehicles (UAVs). We examine the performance of different machine learning and localization algorithms for the purpose of detecting deficiencies in crops by varying the granularity of our sampling techniques. Video feedback harvested at dynamically altering altitudes is processed towards identifying the infected regions as well as the type of deficiencies. Concretely, the monitoring process is divided in two parts; an initial high altitude scan of the field that detects the problematic areas and a low altitude pass that classifies the types of deficiencies. The intention of this classification is to facilitate the observation, measurement, and response to inter- and intra-field variability in crops, also known as precision agriculture (PA). An image classification comparison of the high altitude camera output is performed using logistic regression, naive Bayes, and dictionary learning approaches along with an analysis of their performance. For the low altitude flight, we propose an approach for the localization of the infected crops that will aid the meaningful image gathering.