1ST INTERNATIONAL CONFERENCE

ON RECENT TRENDS IN ENGINEERING AND APPLIED SCIENCES

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ABSTRACT BOOK

MNS University of Engineering & Technology, Multan

Keynote Speakers

Day 1

Name : Dr. Abdul Qadeer Malik

Time : 12:00 - 12:20 pm

Title : Science of Explosives — Their Military and Civil Uses

Abstract : There is an English word “euphuism” which implies to use polite, pleasant and palatable words for hard, harsh/unpleasant and ugly words to name an entity. For example it is polite to address an old person as a senior citizen, a toilet a washroom and so on. In analogy, according to international practice in vogue, explosives are termed as energetic materials to sound less offensive. Energetic materials is a soft word for propellants, high explosives and pyrotechnics. An explosive is a material which, when suitably initiated, can undergo very fast reaction or decomposition in a self-propagating mode with the formation of more stable materials and simultaneous evolution of large amount of heat and gas to produce a practical effect.

High explosives detonate with a velocity to the tune of km/second. Detonation of an explosive is accompanied with very high overpressure of the order of 300-400 k bar. Detonation is a microsecond phenomenon and is manifested in the form of blast, fragmentation and thermal effects. Starting with gun powder about 2000 years ago in china, CL-20 is the latest explosive while octa-azacubane, if it can be made, is calculated to be the ultimate explosive.

Explosives are generally considered a military domain but the fact of the matter is that 75-80% of explosives find their applications in civil sector including coal mining, quarrying, non-metal mining, metal mining, construction, industry and miscellaneous sectors. This lecture discusses, inter alia, chronological development of explosives, their classification, military, non-military uses/applications and some newly developed explosives culminating to the envisaged ultimate explosive.

Name : Dr. Muhammad Arshad

Time : 12:20 - 12:40 pm

Name : Dr Ihtesham Rehman

Time : 12:40 - 01:00 pm

Title : Importance of materials characterisation: from lab to commercialisation

Name : Dr. Yisheng Xu

Time : 01:00 - 1:20 pm

Title : Nanoparticles fabrication through Flash nano-precipitation

Abstract : We take advantage of an emerging nanoparticles assembly technology—Flash nanoprecipitation (FNP) to prepare aqueous high-drug loading nanoparticles stabilized with polyelectrolyte in continuous and large-scalable way. It largely reduces the complexity for NPs functionalization in a facile intensified mixing process compared with conventional chemical modification of inorganic NPs. These as-synthesized particles are high-drug loading, scalable, and most importantly, it is easy to control their sizes and charges through external conditions. The prepared NPs are quite stable over a month and the size could be tuned by external conditions. Toxicity and tumor inhibition experiments confirm the high cell toxicity and good suppression of tumor growth indicating a promising prospect of FNP in the large-scale and continuous yielding of highly stable and high-performing photothermal-chemotherapeutic nanoparticles for cancer therapy.

Name : Dr. Ali Kashif Bashir

Time : 1:20 - 1:40 pm

Title: Internet of Things- A Paradigm Shift :

Abstract : Internet of Things (IoT) and 5G are interrelated terminologies. Applications of IoT and cloud are producing big data that is being stored at data centres. Data centres acting as the backbone for cloud services, but unable to handle the huge amount of traffic. This session will cover the recent advancements to enhance the capabilities of the the whole infrastructure. This session will also discuss how IoT is shaping and reshaping the technologies and societies by giving examples of a few innovative projects the speaker is working on.

Keynote Speakers

Day 2

Name : Dr Javaid Rabbani Khan

Time : 09:30 - 10:00 am

Title : Carbon Emission Intensity, prevention, and analogy of explicit vs implicit approaches.

Abstract : In future, Engineers and Scientists will have to face an enormous challenge due to carbon emission, shortage of water and climate change, etc. Carbon footprint paradigm based on energy resources/ consumption and necessitate to measure both implicit and explicit approaches to achieve sustainability.

The keynote lecture is an effort to identify exactly how positively individuals feel about low carbon footprint products to highlight the measures for accomplishment of pro-low carbon based on explicit vs implicit approaches. The following aspects are the main theme of the lecture.

(1) The total amount of carbon emission from energy consumption world widely and in particularly with reference to Pakistan.

(2) Statistical analysis of various parameters which intensify rate of carbon emission due to industrial, commercial and transportation dynamics that causes ecological deficit environmentally.

Carbon footprint has become an effective approach for evaluating carbon emission, aiming at tracking down total carbon emission across the life cycle to provide scientific bases for carbon reduction. As for computational methods, process analytic method and input-output analysis approach are highlighted.

The analysis is based on a comprehensive literature review, summarizing available data, computational methods, and application with respect to different scales and industrial sectors/infrastructure departments. Prospects for future research trends in carbon footprint will also be discussed.

Name : Dr. Naveed Ramzan
Time : 10:00 - 10:30 am

Name : Dr. Muhammad Kamran
Time : 10:30 - 11:00 am

Title : EHV Induced Voltage Analysis in vicinity of Railway Track for appropriate Right of Way (ROW)

Abstract : Railroad companies and power distribution networks often work together by sharing the same right of way. The safety considerations associated with the design of transmission lines put restrictions on minimum distance (clearances) as well as on the angle at which the other facilities, like railways and roads, may pass below the transmission lines. The standard requires that the railway tracks should cross the transmission line at 90o angle, ideally, or within the range of 45o to 135o with respect to the transmission line. If, due to design restrictions, such design is not achievable then a quasi-static electric field and quasi-static magnetic field study must be carried out using Finite Element Method (FEM), to verify if the touch and step potential limits are not breached under nominal and fault conditions. This presentation will enable to understand system and possible research solution to above stated problem.

Name : Dr. Khurram Joya

Time : 11:00 - 11:30 am

Title : Modular Devices and Nanoscale Assemblies for Solar and Chemical Energy Conversion

Abstract : With the advent on modern science, research and technology, nanoscale assemblies can be engineered and programmed to perform specified function at macro level applications. These nanodevices can be implemented as surface immobilization along with thin-films for catalytic processes, sensing applications and for solar & chemical energy conversion schemes. We have invented, discovered and developed specialized methods, and exploited various thin-film nanoscale materials for catalytic water splitting, CO_2 reduction, and recently for electrochemical sensing, biomass catalysis and solar energy conversion. Now we implement and developing new methods for making advanced electrofunctional nanomaterials and nanoclusters derived from thin-films molecular assemblies, inorganic nanomaterials and metal-oxides displaying great potential to be used in high performance water splitting catalysis and for chemical energy conversion and storage schemes. Later these thin-film functional materials can also be integrated with competent and efficient light-harvesting modules to make solar fuels devices.

Parallel Session A

Name : Mujahid Iqbal

Title : Design and development of Heat Exchanger to Study the Effect of Preheated Air on Engine Performance and Exhaust Gas Emission of a 4-Stroke Diesel Engine

Abstract : Despite high advancement in technology and research work, thermal efficiency of IC engines reached maximum up to 51% for low-speed diesel engines and even low for high-speed diesel engine. Rest of energy is being exhausted in atmosphere through exhaust pipe or dissipated in form of mechanical losses. Mechanical losses can be minimized by efficient mechanical system whereas Thermal efficiency of diesel engine can still be improved by different methods like preventing heat losses during engine cooling, by designing optimum engine piston bowl geometry, proper lubrication system, re-usage of heat loss through exhaust and use of turbocharger also one of them. Turbo chargers use exhaust gas to insert extra air inside combustion chamber, but its drawback is that it produces hurdle in exhaust gas flow. Proper air-fuel mixture inside combustion chamber can also improve combustion efficiency of IC engine. It is obvious that air-fuel mixture inside combustion chamber can be improved by using preheated air. Our aim is to utilize exhaust heat of the engine to preheat intake air for making better replacement of high compression ration or turbo-effect. Thus, in this research, exhaust heat of engine will be utilized to preheat intake air to improve combustion kinetics and effect of inlet air preheating will be studied on exhaust gases emission and engine brake power.

Name : Jahangeer Khan

Title : Process Formulation and Characterization of BCZT modified BiFeO3-BaTiO3 Piezoelectric Ceramics

Abstract : Lead-based piezoelectric ceramic materials have excellent pyroelectric, piezoelectric and energy storage properties with a wide range of industrial applications. However, the use of lead-based ceramics has been regulated due to environmental concerns. Such frowning environmental, health, and safety policies aided to the expansion of the world markets for lead-free piezoelectric ceramics and fostered their development. Among different lead-free piezoelectric ceramic materials, bismuth ferrite (BiFeO3, BFO) and barium titanate (BaTiO3, BT) gained a lot of attention due to attractive electro-mechanical properties after properly optimizing the processing as well as doping parameters. Hence, the aim of this study is to synthesize a lead-free piezoelectric ceramics (1-y-z)(0.65Bi1.05Fe2O3-0.35BaTiO3) yBa(Zr0.2Ti0.8)O3-x(Ba0.7Ca0.3)TiO3, where y = z = 0.0, 0.010, 0.020, and 0.030 by an air quenching as well as furnace controlled cooling method through a solid-state reaction method. The prepared samples were characterized by X-ray diffraction (XRD) analysis, density measurement, scanning electron microscope (SEM) analysis, ferroelectric, and piezoelectric properties. The obtained results showed a pure perovskite structure verified by XRD patterns without any secondary phases. The ferroelectric and piezoelectric properties are significantly enhanced due to the lattice strain induced in the samples. In addition, the electrical properties are improved by reduction in the concentration of the associated defects through rapid cooling as shown in SEM images. The experiment results show that an enhancement in the piezoelectric constant (d33) of 148 pC/N is observed through water quenching process.

Name : Asad Yousaf

Title : Analysis and Design of Steel Overhead Pedestrian Bridge

Abstract : This research deals with the analysis and design of steel overhead pedestrian bridge. This steel overhead pedestrian bridge can eliminate the waiting time of pedestrians to cross the road and eliminate the accidents between pedestrians and vehicles. In this research work, the analysis and design of steel overhead pedestrian bridge is done by using STAAD pro with standard design details as mentioned in AISC (ASD). The planned steel overhead pedestrian bridge is modeled in STAAD Pro. Various loads and load combinations are applied to the bridge as per AISC (ASD) standards.

Name : Furqan Jamil

Title : Applications of advanced phase change materials in thermal management field.

Abstract : Phase change materials (PCMs) play a vital role as energy storage materials in thermal management field. The value of thermal conductivity of pure PCM is very low which can be enriched by various methods and these advanced PCMs are widely used in various applications. In order to increase the thermal conductivity of PCMs, researchers used several optimization methods that involve the inclusion of metal foams, nanoparticles, combination of using various PCMs, encapsulated PCM and forced convection technique. For specific applications, such as thermal control of electronic devices, thermoelectric generators (TEGs) and solar photovoltaic modules, advanced phase change materials having high heat storage capacity and stable thermal phase change behavior which is a promising option in these applications for efficient performance. Therefore, the utilization of advanced PCMs in these applications have proven to overcome the decrement that was in terms of performance and indicated better results.

Name : Asif Durez

Title : Model Based Assessment Of Phase Change Material (Pcm) For Effective Cooling Of Pv Panels Considering Pakistani Climate

Abstract : To overcome the ever-growing energy demand, conventional energy systems should replace fully or partially by innovative systems based on non-conventional energy resources, such as solar power generation systems. PV panel is one of the key solar energy systems. However, its performance is dependent on the panel temperature. As the temperature of the PV panel increases from a limit i.e. 25°C, this in result decreases the efficiency of the PV panel which is about 15-18%. Thus, the optimal decision of the passive cooling technique at the system design stage could result in significant energy savings. In this study, PCM with climatic conditions of different areas of Pakistan are simulated for increasing the efficiency of the PV panels by reducing the surface temperature. Simulated results indicate that PV panels observed a drop in surface temperature by using PCM, which resulted in an increase in efficiency and electrical output by 4% and 18% respectively. When PCMs with a melting point of 44oC is used, the maximum cell temperature can be lowered from 69oC to 54oC in Lahore and 59oC to 43oC in Islamabad during month of July. In the current analysis, it is concluded that PCM-RT44 is most appropriate for passive cooling of PV system for climate classification (BSh) as compared to (Cwa).

Name : Syed Farhad Shah

Title : Experimental and computational investigation of flow rate in microchannel by using one-dimensional paper-based microfluidic pump

Abstract : Microfluidic platforms often use active pumps in order to control and program fluid flow rate in a microchannel. Active pumps have certain limitations in terms of their large size and continuous need of external power source. Recently, to overcome these limitations, a new generation of passive pumps have been explored based on cellulose material called paper-based microfluidic pumps. These pumps being lightweight, inexpensive and simple, provide steady flow rate due to capillary action of paper with better control and programmability. However, simulation of flow in paper-based microfluidics pump and its experimental validation hasn't been investigated in detail yet. In this research, a computational model is developed in COMSOL Multiphysics for rectangular paper pump to investigate flow rate of liquid flowing through it. Porous media and subsurface flow module is used considering the fact that paper is a porous material. An experimental setup is developed to validate the computational model. CO2 Laser cutting machine is used to cut Whatman filter paper grade 1 to fabricate rectangular paper pumps as well as to create microchannels in pressure adhesive films. The whole setup is integrated into a single microfluidic platform. This one-dimensional computational model validated with experimental setup can be considered as a starting point to simulate two- or three-dimensional paper pumps whose analytical models are complex in terms of measurable parameters. With these enhancements, paper-based microfluidic pumps will greatly contribute to improve and programmable miniaturized diagnostic platforms for point-of-care applications.

Name : Gohar Hussain

Title : Experimental Investigation of a light-weight Bullet-Proof Vest based on the Hybrid Composite Laminate

Abstract : Soldiers and law enforcement agencies require good protection against many dangerous scenarios and close combat situations where their movement is affected by the protective gear. Commercially available impact resistive armors are expensive and heavy. With the recent advancements in smart materials, researchers have been focusing on the development of lightweight structures for safety and impact resistive applications. In this regard, composite materials have been widely used in developing durable, impact resistive, cost-effective, and reliable real-time structures. In this research work, four different specimens of a hybrid composite based on the Kevlar and carbon fibers have been fabricated. Experimental investigation of the specimens has been carried out by performing tensile and impact testing. Results reveal that a specimen made up of 6 Kevlar and 2 carbon fibers (K6C2) is best suited for the impact resistive armors. Therefore, a final panel for the bulletproof jacket has been fabricated by considering the 24:8 layers of Kevlar and carbon fibers respectively. Finally, the vest is experimentally tested by utilizing a 9 mm pistol at a local distance of 5, 10, and 15 m. Results depicted that the bulletproof vest made up of K6C2 has successfully stopped the bullets from penetrating the panel by absorbing the impact of the incoming bullet. Additionally, the overall weight of the vest has been reduced to 3 kg from traditional 8 kg. Therefore, based on the outcomes, it is highly recommended to utilize this cost-effective panel for impact resistive applications.

Name : Saad Ahmad

Title : Comparative Performance Evaluation of a Ventilated Brake Disc using Beryllium-Copper and Magnesium Alloys

Abstract : In the automotive industry, vehicles braking system plays a prominent role for achieving the desired ride performance and meeting the safety standards. During the application of brake pressure, equivalent stress is generated within the vicinity of the rotor which adversely affects the life-span and quality of the braking system. Therefore, over the past few years, researchers have been focusing on the Ventilated Brake Disc (VBD) for minimizing the unwanted equivalent stresses and deformations being generated during normal traveling. Conventionally, ventilated brake discs have been manufactured by utilizing Grey Cast Iron. However, the selection of an appropriate material would significantly enhance the disc-quality by eradicating the frictional and thermal effects. Therefore, in this research, the optimal design of the ventilated brake disc has been modeled on Solid works and numerically analyzed on ANSYS. The output response of a particular ventilated brake disc in the form of equivalent stress and deformation has been analyzed by changing the brake pressure ranging from 1 MPa to 2 MPa. Additionally, two new disc materials Beryllium-Copper and Magnesium alloys are considered to investigate the outcomes of the brake-disc under the same conditions of the brake pressure. Numerical results depicted that higher stress to deformation ratio (SDR) is obtained for the Beryllium Copper alloy disc as compared to the ventilated discs made up of the other two materials which means that material is deformed less as compared to the applied stress. Based on the results obtained, it is recommended to utilize the Beryllium-Copper alloy in designing, analyzing, and manufacturing the ventilated brake discs for the stable and optimal braking system.

Name : Muhammad Yousuf

Title : Investigation of the thermal environment of an auditorium HVAC system: A CFD analysis.

Abstract : Heating, ventilation, and air conditioning (HVAC) systems are employed to create a thermally pleasant atmosphere for inhabitants. The thermal environment of the indoor surroundings created by HVAC systems requires rigorous evaluation, as people spend most of their time indoors. A computational fluid dynamics (CFD) approach has been employed to examine the thermal comfort within a university auditorium with ceiling-based air distribution (CBAD) system. CFD analysis is carried out utilizing commercially available software (Fluent 6.3.26) to study the influence of air diffusers' quantity, air temperature, and air velocity on thermal comfort and the performance of the HVAC system. Results indicated that the number of diffusers, air velocity, and air temperature substantially affect thermal comfort. An HVAC system operating at an optimum air velocity of 4.30 m/s, air temperature of 24 °C, and 14 numbers of diffusers can achieve the required thermal comfort for occupants present within an auditorium. The obtained results are compared with the experimental data available in the literature.

Name : Muhammad Usman Tahir

Title : The effect of thermal cycling on flexural strength of fiber metal laminates

Abstract : High performance materials with good strength to weight ratio are always attractive for aerospace industry. Aiming this, a new light wright Fiber/Metal Laminate (FML) is developed. Fiber metal laminates are hybrid composite material built up from layers of thin metals and fiber reinforced adhesives. Aircrafts and its components are subjected to thermal cycling throughout their service life. Thermal cycling is the process of heating of a material, in which material failure occurs due to change in coefficient of thermal expansion. In this research work, fiber metal laminates based on, carbon fiber, glass fiber and aluminum 7075- T6 sheets of 1.0 mm, are used to investigate their thermal cycling behavior due to their prime importance in aerospace industry. To achieve durable adhesive bond, different surface preparation techniques were applied. Aluminum sheets were subjected to NaOH and chromic acid etching to produce a porous surface suitable for strong bond formation in a FML structure. Vacuum bagging followed by hand layup method was used to manufacture FML's composites containing carbon fibers and glass fibers using epoxy resin YD 128. Thermal cycling was applied on the tensile and bending specimens using TESTEQUITY model 115A temperature chamber. Two type of specimens were manufactured using CF/GF/Al/GF/CF and CF/CF/GF/Al/GF/CF/CF sequences. Thermal cycling range given to specimens was -30ºC to +70ºC, having soaking time of 01 hour and 15 minutes on both temperatures. Four different number of thermal cycles (i.e. 10, 30, 50 and 70) were applied to each set of FML's, and the results were compared with the samples, non-exposed to thermal cycling. Three point bending tests were conducted on hydraulic universal testing machine model WDW 100-E according to ASTM standard D7264. Flexural strength was increased after 10 thermal cycles, but it was decreased to some extent after 30, 50 and 70 thermal cycles.

Name : Muhammad Irfan Haider Abidi

Title : Mechanical Characterisation Of Toughened Armoured Composites

Abstract : In battle or other risky circumstances, body armour is a material that protects the body from different types of damage caused by high-speed projectile effects. Because of the advancement in modern handguns, researchers are forced to aggressively study and explore new body armour technologies. A better knowledge of the behaviour of a single or several materials layers during their contact with bullets will greatly aid the creation of multi-layer armour packages. The findings of computer simulations could help speed up the selection of a product structure for ballistic testing, also lowering the costs of optimising packages made of various armour composites. Because of the high velocities, deformations, and collapse of interacting materials, laboratory studies of ballistic interaction are difficult. Traditional tests typically have integral characteristics of the systems, such as pre- and post-impact velocities, the degree of projectile and target final loss. The most significant shortcoming of such findings is their inability to offer insight into interaction processes and to explain the complex processes and failure mechanisms occurring at the communication region. In this research, different hybrid & pure composites of various effective thicknesses are tested against high-speed projectiles of AKM & G-3 gun. A numerical simulation is going to follow the experimentation to validate the experimental data numerically. At the end, an improved toughened armoured material with optimum thickness, effective mass, minimum blunt trauma & high impact resistance is concluded. For it, three materials configurations were selected: Kevlar epoxy, Alumina & SiC. Their's pre-experimentation simulation was done to avoid any financial losses without compromising our research end goals. After satisfactory results, five samples were manufactured, one with Kevlar-rubberised epoxy with 50% rubber; 2 of Alumina, 2 of SiC, each with 8mm & 10mm thickness respectively. After live testing experimental results, numerical simulation using Creo Parametric (1.0) for design, Ansys Workbench (16.0) for boundary values configuration & LS Dyna/LS Prepost (R8.0) were used to validate our experimental results numerically. Experimentally, both weapons bullets (AKM & G3) crossed the manufactured sample & same was proven via simulation. The energy of striking bullet was absorbed by SiC, Alumina hybrid composites & bullet was stopped but Kevlar epoxy pure composite sample wasn't able to stop the bullet. The weight of Kevlar/epoxy Alumina & SiC were 3.7kg, 2.82Kg & 1.84Kg respectively. The max. striking energy for each was noted as 3181J, 3256J & 3321J. Hence, SiC has more impact resistance, less weight, minimum blunt trauma than other two which concludes as SiC is more efficient than Alumina & Kevlar/epoxy composite.

Name : Sohail Shaukat

Title : Assessment of Energy Intensive Techniques for Nearly ZEBs in Residential sector of Pakistan.

Abstract : Due to the absence of energy-efficient buildings policies in Pakistan, the consumption of the Residential sector is almost three folds larger than that on a global scale. Annually, the sector consumes 19.8 MTOE of energy and emits almost 18Mt of CO2. This constantly increasing energy consumption is mainly due to the unawareness of energy-efficient appliances, and passive techniques which include building materials, infiltrations, building orientation and operational skills. However, despite the above-mentioned factors, no cumulative assessment has been performed to measure the effect of all these parameters on annual energy demand of Pakistan. So, this study aims to encourage and promote energy-efficient housing strategies rather than traditional practices in order to minimize the energy demand. Further, this study performs energy assessment of NZEB through use of Passive Housing Planning Schemes that helps to assess the energy saving potential of a common residential sector in Pakistan. PHPP software is used to simulate a common single-story household under climate conditions of Islamabad to effectively model building components like roof tops, external walls, windows, shading, etc. Both conventional and modern materials and techniques will then be incorporated in the software to provide a difference between old and modern energy consumption patterns. The results obtained from the model depicts that using passive techniques, there is a potential to improve efficiency by 35-40%.

Parallel Session B

Name : Muhammad Hasnain

Title : Handwritten Character Recognition System for Dementia Patients

Abstract : Dementia disease is brain disorder that progresses slowly in most people. Symptoms can take years to develop, and most people live for many years with the disease. Handwritten characters recognition is a very difficult task to achieve because dementia Patient's handwritten characters are written in different curved shapes, different sizes, direction, thickness, design and dimension. In this paper work had been perform to recognize handwritten character recognition system using multi layer Perceptron neural network with one hidden layer . Neural networks are good at recognizing handwritten characters because these networks are insensitive to missing data. This paper proposes a four-step approach to recognizing a patient's handwriting using neural network: 1) Pre processing, 2) segmentation, 3) feature extraction, and 4) recognition. Pre-processing includes noise reduction, binary coding, normalization, and modulation. Scanned documents were Pre processed with the help of binary conversion. The process of converting a text image to black and white, also known as a binary bit, It is located in only two colors black and white. After scanning and converting black and white images, noise reduction is used during testing to remove small dots called noise, and pepper noise is used for this purpose. Segmented lines were used to extract characters from scanned pages. Feature extraction involves useful information from a text image in the form of a feature vector. Feature vector consists of pixel values of the natural symbol image. In pattern recognition processing when the algorithm inputs are large for processing and are expected to be mostly redundant (they contain data but do not contain information), the input is converted to a reduced set of features representations (also called feature vectors). The back-propagation neural network is used for classification. Analysis was carried out to determine the number of hidden layer nodes to achieve high performance of back propagation network in the recognition of patients handwritten characters. After testing results show that this method provides better results compared to other methods in positions of recognition accuracy, training and classification time. The recognized characters are converted to editable writing with accuracy of 92%.

Name : Nisar Ahmed

Title : Enhancing the Overall Equipment Effectiveness (OEE) at Shop Floor using Quality Techniques

Abstract : Overall Equipment Effectiveness is a tool to quantify the proficiency and adequacy of manufacturing process. This study aims to introduce an autonomous maintenance system for enhancing OEE at the shop floor by implementing quality techniques using a systematic approach. In this research, experiment of implementing TPM and 5S has been carried out for manufacturing and productive organization. Concept is being implemented in the machine shop having CNC machines of different capacities.
Initially, machine history was analyzed to find out bottleneck machine. Most of the machines lost their accuracy due to aging factor, geometrical errors, and poor maintenance. This study found the bottleneck machine having OEE 51.84%. It was mainly focused to minimize downtime, improve the performance and quality of production with limited resources to improve OEE. The main objective is to convert the bottleneck machine into model machine.
Geometry of CNC machine is considering as most pivotal for accuracy of the job to be produced. Geometry of bottleneck machine was recorded which depicted the geometry out of allowed tolerance level. Hence, corrective actions were taken including grinding of guide ways & slides and incorporation of coating material.
Monitoring through efficient data recording framework and root cause analysis helped to take corrective actions for enhancing OEE of Plant & machinery. TPM pillars have been efficiently utilized for minimizing the losses and consequently enhancing the usage of CNC machines adequately and proficiently to meet production requirements.

Name : Hafiz Kamran Jamil

Title : Effect of Jute Fibers on the Performance of Concrete with Recycled Coarse Aggregates

Abstract : Concrete is mostly used in construction projects. Different types of additives e.g. fibers and cementitious material are used to increase the mechanical and durability properties of concrete. Furthermore, recycled coarse aggregates (RCA) are a good substitute for natural coarse aggregate (NCA) because of their increasing attention towards associated environmental benefits and sustainable development in the present decades. However, this necessitates the investigation of mechanical and durability properties of concrete with RCA and jute fibers (JF). Therefore, this paper investigates the effect of jute fiber (JF) reinforcement on the compressive strength and porosity of concrete with the addition of recycled coarse aggregates (RCA). Locally available jute fibers having 10 mm length are used in this investigation. In this case, two types of mixes are made using 0% RCA (natural coarse aggregates, NCA) (control mix) and 100% RCA, and in each of these mixes, 0%, 0.30%, and 0.60% of the volume of the fraction of jute fiber (JF) are used. Mechanical property is evaluated by compressive strength test whereas durability property is evaluated by porosity test. The specimens were tested after 28 days of curing for mechanical and durability tests. The experimental results show that the addition of 0.30% jute fibers (JF) has a positive effect whereas the addition of 0.60% jute fibers (JF) has negative effects on the mechanical property of concrete in 0% RCA and 100% RCA mixes. While in the case of the porosity test, the addition of fibers and recycled coarse aggregates (RCA) increases the porosity of the concrete in all the mixes.

Name : Haris Hussain

Title : Application of Fractional Derivatives in Characterization of ECG graphs

Abstract : In this paper we have studied left ventricular hypertrophy(LVH) and right ventricular hypertrophy(RVH) of heart from Electro Cardiogram Graph (ECG) using fractional calculus. An ECG is a rough or unreachable curve which is continuous everywhere but non-differentiable at some points or all points where classical calculus fails. Our purpose of this paper is to find left and right fractional derivatives at those non-differentiable points and then predict LVH and RVH by calculating the phase transition values (absolute difference of left and right fractional derivatives). Fractal dimension and Hurst exponents of V1, V2, V5 and V6 leads of the ECG's have been calculated for both problematic and normal ECG's. All such measures may help doctors to diagnose LVH and RVH from ECG in more accurate manner as compared to the other techniques.

Name : Mannan Hassan

Title : Dynamic Modeling and Scalar Control of AC Induction Traction Motor in China Railway

Abstract : The control and estimation of induction motor drives constitute a vast field, and the technology has further advanced in recent years. The coordinate transformation has been introduced and established with the mathematical-models of the induction motor (CRH3 high-speed Electric Multiple Units in China Railway) in the two-phase rotating reference frame and the two-phase stationary reference frame. Ac drives in general are considerably more complex than those of dc drives, and this complexity increases substantially if high performances are demanded. The main reasons for this complexity are the need of variable-frequency. Open loop volts/Hz control of an induction motor most popular method of speed control because of its simplicity, voltage is required to be proportional to frequency so that the flux ($\psi s = Vs/We$) remains constant. The PWM controller is merged with the inverter block. Speed Control with Slip Regulation An improvement of open loop volts/Hz control is close loop speed control by slip regulation. The slip is added to the feedback speed signal to generate the frequency. MATLAB/Simulink Simulation results are discussed and compare the open loop and closed loop Volts/Hz Scalar control.

Name : Muhammad Sarmad Mahmood

Title : Development of mechanical properties of Self-Compacting concrete using various cementitious materials and its validation by Artificial Neural Network technique

Abstract : In recent years, numerous investigations about the impacts of filler and binding materials on the properties of self-compacting concrete (SCC) have been carried out. The disposal of waste material is a big issue in a country like Pakistan where the most important element of the construction field is concrete. Utilizing certain waste materials in our experimental work, total 12 samples were prepared using Marble Powder (MP) as sand replacement with ratios of 10% and 20% and rice Husk Ash (RHA) used as cement replacement with ratios 0% to 25%. The purpose of this study is to develop mechanical properties of SCC and to check the feasibility by using Artificial Neural Network (ANN) technique for the prediction of hardening properties of self-compacting concrete comprising various cementitious materials. The model is based on back propagation network technique using Levenberg-Marquardt (LM) Algorithm. The various input parameters of neural network effecting the mechanical properties of Self compacting concrete are cement content, water, RHA, Marble Powder, Coarse and Fine Aggregates and Super Plasticizers (SP). The output parameter of ANN is compressive strength. The effectiveness of ANN model is assessed by comparing its result values with experimental data. Our Results after comparing with experimental values shows that the ANN Model has shown training, validation, and test accuracy of 98%, 97% and 93% respectively with an overall accuracy of 97% for compressive strength of SCC.

Name : Muhammad Huzaifa

Title : Investigation Of Asphalt Binder Properties Modified With Rice Husk Ash And Waste Engine Oil

Abstract : Disposal of vast amount of waste materials like that Rice Husk Ash (RHA) and Waste Engine Oil (WEO) are one of main root cause of environmental hazards in form of water and air pollution. As well, un-availability of space is another big concern related to their safer disposal. The usage of these waste materials in neat binder not only enhance asphalt binder properties but also helps in reducing environmental issues. In this study Rice Husk Ash with 2% 4% 6%, are mixed with Waste Engine Oil with 2% and 4% have been used to modify neat binder. The modified neat binder specimens are evaluated by Bitumen Bond Strength test, Rolling Bottle test and multiple stress creep recovery test along with conventional testing to evaluate the adhesion, moisture susceptibility and elastic recovery of modified neat binder. Experimental study explain that bitumen modified with 6% Rice Husk Ash and 2% Waste Engine Oil by weight of neat binder shows better adhesion, moisture susceptibility and elastic recovery as compared to neat binder and best sustainable and environmental friendly reuse of Rice Husk Ash and Waste Engine Oil.

Name : Ghulam abbas

Title : GIS-based Identification of River Bank erosion and Flood Water Management

Abstract : Indus River in district of Southern Punjab, Layyah started to erode the residential as well as agricultural land at left bank (31°4'0.321"N, 70°49'41.066"E) in 2000. At that time the local government constructed the spurs on left bank to tackle the erosion problem of flowing river. It proved to be a short term solution because in 2010 despite the construction of spurs the river started to erode, eventually resulting in the construction of spurs at left back once again. The present research work emphasis on analyzing the river shifting behavior as well as to apply the Geological information sources (GIS) and Remote Sensing (RS) methods for geomorphology analysis progress. This propels us to gather Remote Sensing information and Topographical information for 20 years shifting of river bank. Because the geomorphology of Indus River is continuously changing, due to which the area of Indus River decreases day by day. GIS mapping of river erosion shows that from 2000 to 2010 the natural river cross section is disturbed by 50km2 to 48. 83Km2 and from 2010 to 2020 reduction of river area is from 48. 83km2 to 31. 02Km2. The Results Shows that the change in the stream bank is because of different common and synthetic exercises like flood, flow velocity, deposition of eroded materials, expulsion the vegetation covers and soil stability disturbances. Also we have conducted 200 interviews from local community individuals discussing river erosion and flood water management in the month of peak discharge. The statics shows that 59% remarks were “inappropriate river training” and 43% remarks were about “poor flood water managements”.

Name : Zeeshan Ahmad

Title : Influential assessment of different fibers on the mechanical performance of concrete incorporated with E-waste aggregates

Abstract : In this modern era, concrete has become a vital construction material whose manufacturing is leading towards the tremendous consumption of natural resources. To overcome the depletion of natural resources, it has become essential to seek out alternate resources for the ingredients of concrete. According to many researchers, the utilization of non-biodegradable waste items is a sustainable solution. Nowadays, some researchers are struggling to use electronic waste as a partial substituent for the coarse or fine aggregates in concrete. Electronic waste or E-waste is the non-biodegradable waste that consists of discarded old computers, CDs, DVDs, VCRs, TVs, radios, keyboards, mice, etc – basically, any electronic appliances that have completed their effective working life. In this experimental-based investigation, shredded electronic waste materials are utilized as coarse aggregates in concrete with a constant volume replacement of 30%. Shape, size, and roughness of shredded electronic waste aggregates are relatively matching with that of the natural coarse aggregates. Shredded electronic waste coarse aggregates are much lighter than the natural coarse aggregates and have relative density 1.03 which results in the production of lightweight concrete. As, concrete is strong in compression but weak in tension, that is why polypropylene macro synthetic fibers are used to overcome the brittle nature of concrete. Experimental results show that the fibrous materials have a better influence on the compressive and tensile strengths of E-waste aggregated concrete. By the addition of only 0.5% fibrous material, the compressive strength of E-waste aggregated concrete increases about 15% while tensile strength increases about 35% as compared to control specimen.

Name : Muhammad Hamza Saeed
Title : Solar-Wind-Hydro-Diesel Hybrid Power System Suitability Analysis On Selected Sites In Azad Kashmir

Abstract :

Parallel Session C

Name : Zeeshan Ahmad Ali

Title : Enhancing Efficiency of Product Delivery Process in Steel Industry by Using Simultaneous Engineering

Abstract : Demands and level of customer's satisfaction are increasing day by day; customer requires product development in short span and at low cost. In order to cope up challenges and fulfill customer demands, traditional ways of manufacturing must be upgraded with the help of simultaneous engineering. The core objective is to use the resources efficiently in manufacturing industry to increase the profit. To be effective, currently industries are working in sequential side by side process i.e. planning, manufacturing, QA/QC, packing etc. The aim of this research is to accomplish sustainable production with minimum production time, less cost/rejections, improved quality and team work environment. The case company is facing traditional issues which are production barriers and technology gaps. Workers are less trained, due to which barrier walls are among the departments. No use of computers, technological advancements are under initial developing stage because workers don't want to withdraw traditional production methods. Workers have fear in minds for uncertainty because of lack of health and safety standards. Another reason for production cost is wastage. The case company goes through different phases for enhancement of efficiency in product development. In first phase, data is collected by checking present production process in depth, different individuals were interviewed, quality checks and departmental communication was contemplated. Second phase involves selection of professional team, technological advancement in pumping section, addition of metallography lab and universal testing machine for quality control. CNC notching machines were inducted for better quality and finish of product with standard size accuracy. International standards are being followed. This is a time consuming approach in order to introduce new product which also increases the product cost. In order to deal with this situation, simultaneous as a tool is a collaborative approach. Numerous organizations are revealing acceptable outcomes from their utilization of Simultaneous Engineering standards.

Name : Muhibullah Muhibullah

Title : Future of Metalworking Fluids for Sustainable Manufacturing

Abstract: In the 21st century, climate change and environment has become increasing relevant. Making manufacturing sustainable by the use of methods that reduce the impact on environment and health of workers is therefore fundamentally important.
Metalworking fluid (MWF) is an integral part of machining today. Its primary role is to act as a coolant and a lubricant. Thus, by reducing temperature and friction, it enhances tool life and results in better surface finish and tolerance control for the part. Most of the MWFs in use today are petroleum-based oils with additives that are toxic and non-biodegradable. Hence, MWF is an excellent candidate for research in sustainable manufacturing.
Flood coolant method is the predominant method in industry. Machines currently in use already have the equipment for the flood coolant method. Secondly, this method is used effectively for different materials and cutting conditions and hence its popularity.
However, the flood method has negative effects with regards to environment and health of machinists. It is not very economically attractive because of high volumes of MWF used, the associated systems required with it and the cost of disposal. By one estimate, the quantity of the coolant required, for example in grinding operation, is almost 60L/h. There is also the added work needed to dry the chips before recycling.
Overtime MWFs become contaminated by microorganisms. Their disposal becomes necessary. Large quantities of MWFs containing toxic metal particles, biocides, anti-corrosion agents and other harmful chemicals need to be released into the environment.
Because of the above-mentioned challenges, it is important to look for environmentally friendly solutions. This paper discusses the future trends in machining including use of vegetable oils, use of nanofluids with graphene, minimum quantity lubrication, dry lubrication, and cryogenic lubrication as possible answers to the challenge of environmental protection.

Name : Abid Hussain

Title : Improvements In Casting Process Parameters For High Manganese Steel Bolts Of Kpt Buckets

Abstract: Casting is a manufacturing process which is adopted to make different shapes; may ex-perience defects like shrinkage, porosity and short metal filling, resulting in rejection of casting. These defects are highly dependent on design of casting parameters (design of gating and riser system) and reduced by improving design of casting parameters. In this work High Manganese Steel (Hadfield Steel) Bolts of Buckets for Karachi Port Trust (KPT) industry were produced in CO2 sand molding technique. Designing of Gating and Riser system was done firstly using Traditional/Manual method and then by SolidCast Simulation method. Castings were produced using both designs to verify the extent of defects and their difference/improvement. Visual examination of castings designed by Manual method showed major shrinkage defects whereas Software designed castings were quite sound showing no shrinkage (macro porosity) and micro porosity was ob-served in castings. So, it was concluded that SolidCast simulation software can shorten the lead time by eliminating the tedious and time-consuming trial production as well as decrease the financial loss imparted in the trial castings stage. Also, the Casting quality was improved, and casting yield was increased from 43% to 53%.

Name : Muhammad Akhtar

Title : Synthesis and Characterization of Lead Free 0.65BF-0.35BT-BCT Piezoelectric Materials

Abstract:
Lead based piezo ceramic materials have been widely utilized in sensors, actuators, transducers and many other electronics devices. But Pb is toxic, and the increasing application of lead based piezoelectric materials are deleterious for environment and human health which can produced concerns. So, in this research a new lead free bismuth based piezo ceramic (1-x) (0.65BiFeO3 - 0.35BaTiO3) - x(Ba0.7Ca0.3TiO3) has been synthesized by a conventional solid state reaction method followed by quenching process. X-ray diffraction of BF-BT-BCT sample showed that powder calcined at 700°C show pure perovskite structure without any secondary phase. Compacted microstructure was observed by Scanning electron microscope (SEM). An improvement in ferroelectric and piezoelectric property was observed at optimal composition. A piezoelectric charge constant of d33 = 189pC/N was observed.

Name : Farhan Amjad

Title : Optimization and Yield Improvement of Hadfield Steel (ZGMn13Cr) for Bushes

Abstract: In the casting process different shapes achieved, but different casting defects experienced during process like shrinkage, porosity, short metal filling, due to which rejections occurs in the castings. The main reasons of these defects are designs of casting parameters (risers and gating systems), by improving designing of casting parameters rejections can be reduced. In this work, casting of Had Field Steel (ZGMn13Cr) for Bushes used in KPT Port Buckets were produced using CO2 Molding Techniques. First of all, casting parameters designed using manual calculations and then Solid cast Simulation software. Casting of bushes were produced using both techniques for comparison of results(yield).it is concluded that solid cast simulation techniques take less time by eliminating the tedious and time-consuming trial production and also reduce the financial loss imported in trial castings. Casting yield was also improved 43% to 50% because weight of gating system and risers was reduced using solid cast simulation software.

Name : Muhammad Kashif Nazir

Title : Structural and Electrical Properties of BZT-modified 0.65BF-0.35BT Piezo-Ceramic

Abstract: Lead-free piezoceramics materials aim to replace the market-dominant lead-based piezoceramics that have been extensively used for more than a decade worldwide. In this article, the structure, ferroelectric and piezoelectric properties of (1-x)(0.65〖BiFeO〗_3-0.35〖BaTiO〗_3)-x(Ba(〖Zr〗_0.2 〖Ti〗_0.8) O_3) piezoceramics that have been synthesized by a conventional solid-state route followed by water quenching process were investigated. X-ray diffraction peaks of BF-BT-BZT sample showed that powder calcined at 700°C, exhibit pure perovskite structure without any secondary phase. A scanning electron microscope (SEM) was used to find the grain size and surface morphology of the investigated piezoceramics. At sintering temperature of 1020°C, saturated ferroelectric (P–E) hysteresis loop with remnant polarization (P_r=28.5μC/〖cm〗^2) and coercive field (E_c=27.5 kV/mm) is obtained. The encouraging results of piezoelectric constant d_33=175pC/N was achieved. These properties prefer that these piezoceramics encouraging for high-temperature actuators applications.

Name : Tajamal Akhtar Ali Anjum

Title : Effect of Lafeo3 Modification On Structural And Electrical Properties Of Bf-Bt Ceramics

Abstract: Lead-free (1-x) (0.65 Bi1.05FeO3) - 0.35 BaTiO3 - x LaFeO3 crystalline solution has been fabricated by solid-state reaction followed by furnace cool process at the range of x=0.01-0.04. Calcination was done at 700 °C for 2 hrs. and pallets were sintered at 1000 °C for 3 h. Structural and microstructural properties were analyzed by Scanning Electron Microscope (SEM) and X-ray diffraction of the prepared ceramic sample that showed single perovskite phase structure with no secondary phase. The density measured of sintered pellets is 〖7.1g/cm〗^3 was obtained. The value of piezoelectric constant d 33=155pC/N was obtained for optimal composition. Our results show that BF-BT with small La addition is a good lead-free piezoelectric ceramic material.

Name : Naveed Ahmed Siddiqui

Title : Investigation of Thermo-mechanical Processing To Reduce Structural Defects In A572-Gr65 Low Alloy Steel

Abstract:
The main objective of this research is to investigate the reason of cracking occur during forging and low tensile strength of low alloy steel grade “A572/Gr-65”. Samples are forged using 800 ton hydraulic press and various heat treatment processes like annealing, normalizing, quenching followed by tempering are applied to study their influence on properties. Microstructural changes before etching and after etching after different heat treatment process have been studied by using optical microscope. SEM is also performed on as-forged sample to study the reason of cracking occur during forging. EDX showing the percentage of non-metallic inclusions i.e alumina and porosity which is because of gases entrapped at the initial stage of melting, pouring, and solidification. Non-metallic inclusions are the foreign substances and cause disturbance in the homogeneity of the structure ultimately cracking and fatigue failure during forging. This can be minimized by using bottom pouring technique, ladle refining, & vacuum degasing process. Improvement in mechanical properties is observed in sample which is normalized followed by tempering process.