International Journal of Technology (2014) 1: 1-2
ISSN 2086-9614

CREATING ALTERNATIVES THROUGH DESIGN AND TECHNOLOGY INNOVATION

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End products in all industries are increasingly dependent upon a highly innovative design and technology to meet their ultimate goal of development. In particular, the advent of design and technology has made a critical improvement to components that are expected to function properly in order to contribute to high performance products. As expectations and demands rise, scientist and technologist are focusing on product quality improvement and thus achieving higher levels of design and technology availability by re-examining current processes and procedures to create alternatives that are more ideal and optimum.

Furthermore, product innovation has been seen as idea generation in the creativity stage, formalization processes and the successful application of concept in terms of output. The value of a 'thing' can be measured from how well the 'thing' performs its designated functions and achieves its purpose. Since identifying functions enables us to propose alternative ways to perform those functions in the act of idea generation, an 'extended function' will set a new context (purpose and goal) of a system. It also leads to an improvement of products. The ability to consider alternative ways or processes that could perform the same set of tasks with added benefit stimulates inquiry and explores further the original ideas.

This season, we are pleased to present ten selected papers dedicated to design and technology improvement in various areas. With this theme, the issue discuses creating alternatives based on improving selected critical factors or variables to boost product or process performances.

The first paper, written by Y.N. Bahar, J. Landrieu, C. Pere, and C. Nicolle, highlights the importance of energy efficiency and integration of virtual reality (VR) technology to optimize building design, particularly in relation to heritage buildings. This paper describes the development of an application to visualize thermal data for building energy efficiency in a virtual environment (VE). It shows that the use of data workflow and thermal metaphors can improve interaction with the simulation and immersion in the VE. Furthermore, based on the simulation and experimental works, the authors argue that the system enables the user to interact with the VE while assessing the comfort of the thermal settings of the room.

The next paper, written by N.K. Gupta and A.S. Jethoo, evaluates a declining trend of water inflow in the Rajasthan dams and show how dependabilities of the river basins have been reduced. A total of 115 major & medium dams in the state have been selected by cluster sampling. The authors found that the regular phenomenon of decreased water inflow in the dams has resulted in disruption of water resources planning of the state. Non-receipt of computed water results in failure of water management plan of the state leading to the formation and execution of contingency plan on war footing every year. As a result, the authors argue that there is an urgent need of proper planning and management and reducing quantum of water in dams.

The third paper, written by P. Saha, P. Bhattacharyya, and A. Dandapat, examines an improved floating point multiplier design based on canonical sign digit. Array structure was implemented through Hatamain's scheme of partial product generation along with Baugh-Wooley's (B.W) sign digit multiplication technique. The authors argue that the implementation methodology ensures stage reduction, leading to substantial reduction of the propagation delay and power. Transistor level simulation for FP multiplier circuit was performed through Cadence Spice Spectre simulator using 90nm CMOS technology. Implementation methodology offered ~52%, ~42% improvement in propagation delay while corresponding reduction of power consumption are ~36%, ~26% for the (32×32) bit FP multiplication circuitry in comparison with conventional and B.W implementation techniques, respectively.

The fourth paper, written by G. Wibisono, T. Firmansyah, P.S. Priambodo, A.S. Tamsir, T.A. Kurniawan, and A.B. Fathoni, proposes a design of a compact multiband bandpass filter (BPF) based on folded dual crossed open stubs (DCOS). The proposed multiband BPF generated six frequencies at center frequencies of 0.950 GHz, 1.85 GHz, 2.65 GHz, 3.35 GHz, 4.375 GHz, and 5.25 GHz. Furthermore, the proposed BPF based on folded Dual Crossed Open Stubs (DCOS) is an expansion of tri-band BPF based on a single COS, where the second COS is

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Permalink/DOI: http://dx.doi.org/10.14716/ijtech.v5i1.147

used to generate second additional tri-band. As a result, the authors argue that insertion loss, return loss, VSWR, and group delay of the proposed multiband BPF satisfy the design requirements.

The fifth paper, written by Y. Matsunaga, S. Machmudah, Wahyudiono, H. Kanda, M. Sasaki, and M. Goto, examines subcritical water extraction and direct formation of microparticulate polysaccharides powders from Ganoderma lucidum. Subcritical water was applied to G. lucidum for the extraction of polysaccharides at temperatures of 373–463K and pressure of 4.0 MPa using a semi-batch system and further contacted with hot air (443K, in fact 430–447K) to produce microsphere particles. As a result, the molecular-mass characteristics reveals that main mass peaks of water soluble products distributed at around 688–2636 m/z with a peak-to-peak mass difference of 162 m/z, consistent with the repeating units of glucan.

The sixth paper, written by W.S. Winanti, W.W. Purwanto, and S. Bismo, provides an assessment of decomposition of Carbon Dioxide (CO_2) in three-pass flow dielectric barrier discharge plasma reactor. Three types of reactors lengths, i.e. 36, 24 and 12 cm (Re1, Re2 and Re3), were used to observe the possibility of CO_2 decomposition performance inside the reactor. The CO_2 flow rates were 500, 1000 and 1500 SCCM/minutes and the voltage of the reactor were 5.4 to 9.5 kV. The authors argue that the best feed flow rate was 500 SCCM/minutes, the Specific Energy (SE) was 270 kJ/mol and the electrical voltages reached maximum conversion at the reaction time of 2.1 minutes.

The next paper, written by C. Hannachi, F. Guesmi, K. Missaoui, and B. Hamrouni, examines application of adsorption models for fluoride, nitrate and sulfate ions removal by AMX membrane which carries a quaternary ammonium functional group. The fitting of the Freundlich, Langmuir and Dubinin–Radushkevich adsorption models to the equilibrium data was performed at different temperatures from 283 to 313K. Adsorption analysis results obtained at various temperatures showed that the adsorption pattern on the AMX membrane followed the Langmuir isotherms rather than Freundlich and Dubinin–Radushkevich models.

The eighth paper, written by E. Kusrini, D. Tristantini, Slamet, V.M. Setianingrum, and Y. Yulizar, presents a synthesize of high luminescence materials containing optimal combination of ternary europiumpicrate complex and matrices. The microparticles of europium-picrate-triethylene glycol complex were prepared by precipitation-evaporation and then compared to the analogous complex or microcomposite prepared by in-situ method. The authors argue that the microcompositesEO3-Eu-Pic/PMMA coated onto scrapped Al substrate had the highest fluorescence intensity relative to the microcomposites EO3-Eu-Pic/PMMA coated onto unscrapped Al and glass substrates.

The next paper, written by M.I. Ismail and Z. Taha, evaluates hardness distributions of multiple passes in surface hardening of tool steel by plasma arc. As a result, the authors argue that the hardness is higher at the centre of the plasma arc hardening tracks, and then decreasing in the region adjacent to each plasma arc track. Furthermore, it is found that the formation of hardened zone hardness in multiple passes of non-overlapping scan is more uniform in each scan when compared to the overlapping scan. However, hardness distribution of overlapping scan in width direction shows that it is more uniform compared to non-overlapping scan.

The last paper, written by M. Basuki, D. Manfaat, S. Nugroho, and A.A.B. Dinariyana, discusses the probabilistic risk assessment of shipyard industry by using Bayesian method. A Value-at-Risk (VaR) as probability value was determined and Bayesian probabilistic analysis was conducted on each node on the vessel construction process network model. Analysis was conducted on three main components on new vessel construction, including design components, material and production components, and sub-components. The result showed that the probability of delay for the new vessel construction were caused by: design delay of 0.05 mainly caused in yard plan, material delay of 0.65 mainly caused in hull and machinery outfitting, and production delay of 0.3 mainly caused in hull construction.

I hope that this special edition of IJTech conveys some new insights in the way we conduct our research. I am pleased to accept and respond to any comment and enquiry you may have on the direction and content of IJTech and I invite you to join us in this venture by sending your work for consideration.

With warmest regards from editorial desk,

Dr. Mohammed Ali Berawi
Editor-in-Chief