Editorial

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Biographical notes: Desheng Dash Wu is a Special-Term Professor at the Management School, Chinese Academy of Sciences, Beijing, China and Senior Lecturer with the Stockholm Business School, Stockholm University, Stockholm, Sweden. His current research interests include mathematical modelling of systems containing uncertain and risky situations, with special interests in the finance-economics operations interface, maximising operational and financial goals using the methodologies for game theory, and large-scale optimisation. He has published over 100 ISI-indexed papers in refereed journals such as *Production and Operations Management*, *Decision Sciences*, *Risk Analysis* and the *IEEE Transactions on Systems, Man, and Cybernetics*.

Tremendous advanced *technology* has been observed in the past decade to facilitate production. This is partially due to the development of the internet, enabling production of *emergency materials by use* of supply chain operation through smooth information flow and material flow (De Landa, 1991; Fishman, 2006).

Emergency materials and product play an important role in emergency engineering management. As a good-practice emergency materials and product technology, evaluating the ability of the current resources reserve system is the first step of developing such advance technology. This technology has enabled improved production methods and development of global operations (Schweitzer and Cachon, 2000; Magee, 2007; Wu et al., 2011).

This special issue seeks to shed light on emergency materials and product technology. It consists of five papers reporting research on various aspects of emergency materials and product technology. This special issue thus includes a decision making methodology for material selection in sugar industry using hybrid MCDM techniques, study of effect of roughness geometries in contact mechanics, study of effect of bright annealing process on the properties of TIG welded duplex stainless steel tube, a review on wrought magnesium alloys processed by equal channel angular pressing (ECAP) and study of polynomial neural networks (PNNs) with a weighted direct solution and their application in stock index prediction.

- Loganathan Anojkumar et al. report on an application of multi criteria decision making (MCDM) technique for selection of suitable material for pipes to reduce

the corrosive wear in sugar industry. The proposed MCDM technique involves fuzzy analytical hierarchy process (FAHP) is integrated with technique for order preference by similarity to ideal solution (TOPSIS) and VIKOR techniques. FAHP is used to determine the criteria weights, whereas TOPSIS and VIKOR used to find the performance ranking of the alternative materials. This study focuses on five stainless steel grades such as J4, JSLAUS, J204Cu, 409M, 304 and seven evaluation criteria such as yield strength, ultimate tensile strength, percentage of elongation, hardness, cost, corrosion rate and wear rate to select the appropriate material.

- Abdeljalil Jourani studies the influence of roughness geometries on the contact force, contact area and pressure distribution during a static contact between a rough surface and a smooth rigid plane by using two elastic geometrical models. The first one is spherical where each asperity can be characterised by the height and the radius of curvature. The second approach is a conical where the rough contact is modelled by cones. In order to discuss the validity of these two geometrical models, they are compared with a numerical solution of the Boussinesq equation which does not take into account the local geometry of the asperities. The results show clearly that the conical model allows having more realistic values of the contact parameters and model correctly the elastic rough contact. However, the spherical approach of the asperities overestimates the pressures undergone by the asperities.
- Muralidhar Avvari et al. review the importance of wrought magnesium alloys with their applications to accomplish the essential development of components. In addition, the different approaches of ECAP process for refining the grain size to achieve the ultrafine grained material on the bulk metals are discussed. Recent developments in the ECAP process are outlined clearly with their importance to overcome many complexities. Various factors like processing temperature of a specimen, die geometry, ram speed, back pressure and processing routes influencing during ECAP process of wrought magnesium alloys at different conditions such as channel angle and corner or outer arc angle are discussed. Finally, the properties of ECAP processed wrought alloys are outlined for improving the microstructure in structural parts.
- Ramazan Kaçar and Hayriye Ertek Emre demonstrate that passivation is the process of forming a protective oxide film on stainless steel. It is accomplished through an appropriate in-line bright annealing process. Duplex stainless steel exhibits optimum mechanical and corrosion properties with the austenite-ferrite phase balance in its structure. However, the ferrite-austenite equilibrium in duplex structure can also be affected by in-line bright annealing process, in which the heating of stainless steel to a suitably high temperature in a reducing atmosphere takes place. For this reason, the effect of in-line bright annealing process on the microstructure and mechanical properties of TIG welded AISI2205 stainless steel tube was evaluated in this study. The results point out that the structure and mechanical properties of the duplex stainless steel tube are affected by the in-line bright annealing process. In the light of foregoing findings, the sample that was in-line bright annealed in reducing nitrogen gas atmosphere has given optimum mechanical properties.
- Wei Shen et al. believe that a method for increasing the forecasting accuracy of stock indexes has long been a key problem in financial forecasting and management fields. To resolve this problem, we propose a stock index forecasting model based on a

generalised multivariate PNN. First, a single-hidden-layer generalised multivariate PNN is designed, while an optimal weight vector, which makes this PNN the best approximate polynomial for the unknown function, is proven to exist. Next, concepts of the upper and lower bounds of the natural sequence of hidden layer nodes are generated; then, formulas for the number of hidden-layer nodes and the PNN are given. In addition, the importance value index is creatively designed, making it possible to select variables through the model itself. Moreover, partial derivative analysis is introduced, which fundamentally resolves the issue of neural networks lacking interpretative capabilities. Furthermore, we describe the design of a direct solution of weight and confirm through approximation by an iterative method that the weight vector produced through this solution is the best one. Finally, we build a stock index forecasting model based on a generalised multivariate PNN and design a MATLAB-based graphical user interface (GUI). Through empirical analysis and comparison, the effectiveness and usefulness of the above model and its GUI in stock index forecasting is tested.

Thus, the special issue includes a variety of perspectives on tools and methods in dealing with emergency materials and product technology. A variety of tools are used, using such diverse analytic tools as survey research, PNN, regression, multiple objective programming, and FAHP. The focus of all was on how decisions involving emergency materials and product technology can be supported. We hope that this special issue provides views of how this important perspective of emergency materials and product technology can be supported with the state-of-the-art analytic techniques.

References

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