บทความที่น่าสนใจประจำเดือนมิถุนายน 2559
สาขาวิทยาศาสตร์และเทคโนโลยี

1	Title:	Sliding Mode Minimum-Energy Control for a Mechatronic Motor-Table System
	Author:	Kun Yung Chen
	Journal:	IEEE/ASME Transactions on Mechatronics, Volume:21, Issue: 3, June 2016, Page(s):1487 - 1495
	Abstract:	In this paper, the proposed sliding mode minimum-energy control (SMMEC) consists of sliding mode control (SMC) and minimum-energy control (MEC), and is proposed for a mechatronic motor-table system. First, the complete mathematical model containing the mechanical and electrical equations is successfully formulated, and the energy balance equation is found. Second, the MEC based on Hamiltonian function is exactly obtained from the linear motor-table system. The SMC is added to have the good robustness control performance for the nonlinear motor-table system with external loading, forces and frictions. Our main contribution in this paper is to integrate the MEC's minimum energy and SMC's robustness control performances, and the SMMEC is proposed to perform the robust MEC for the nonlinear mechatronic motor-table system. Finally, the proposed SMMEC is realized by experiments to validate its performance of robustness and saving energy, and comparisons between numerical simulations and experimental results are made for the nonlinear mechatronic motor-table system.
	Database:	IEEE/IET Electronic Library (IEL)

2	Title:	Winding Machine for Automated Production of an Innovative Air-Gap Winding for Lightweight Electric Machines
	Author:	Norman Borchardt ; Ralf Hinzelmann ; Dominik S. Pucula ; Wolfgang Heinemann ; Roland Kasper
	Journal:	IEEE/ASME Transactions on Mechatronics, Volume:21, Issue: 3, June 2016, Page(s):1509 - 1517
	Abstract:	This paper presents a newly developed winding machine, which enables an automated production of stator-mounted air-gap windings with meander structure. This structure has very high accuracy requirements. Therefore, automation is realized by the interaction of 15 actuators and a compound construction with 13 degrees of freedom. The programming works with discrete open-loop motion control to generate the kinematics. Above all, a flexible prototype of the winding machine is developed, manufactured, and tested for a motor with external rotor. Finally, experimental results of the developed automation for air-gap windings with meander structure are presented.
	Database:	IEEE/IET Electronic Library (IEL)

3	Title:	Contraction Sensing With Smart Braid McKibben Muscles
	Author:	Wyatt Felt ; Khai Yi Chin ; C. David Remy

Journal:	IEEE/ASME Transactions on Mechatronics, Volume:21, Issue: 3, June 2016, Page(s):1201 - 1209
Abstract:	The inherent compliance of soft fluidic actuators makes them attractive for use in wearable devices and soft robotics. Their flexible nature permits them to be used without traditional rotational or prismatic joints. Without these joints, however, measuring the motion of the actuators is challenging. Actuator-level sensors could improve the performance of continuum robots and robots with compliant or multi-degree-of-freedom joints. We make the reinforcing braid of a pneumatic artificial muscle (PAM or McKibben muscle) “smart” by weaving it from conductive insulated wires. These wires form a solenoid-like circuit with an inductance that more than doubles over the PAM contraction. The reinforcing and sensing fibers can be used to measure the contraction of a PAM actuator with a simple linear function of the measured inductance, whereas other proposed self-sensing techniques rely on the addition of special elastomers or transducers, the technique presented in this paper can be implemented without modifications of this kind. We present and experimentally validate two models for Smart Braid sensors based on the long solenoid approximation and the Neumann formula, respectively. We test a McKibben muscle made from a Smart Braid in quasi-static conditions with various end loads and in dynamic conditions. We also test the performance of the Smart Braid sensor alongside steel.
Database:	IEEE/IET Electronic Library (IEL)

4	Title:	Conductivity in carbon nanotube polymer composites: A comparison between model and experiment
	Author:	Micaela Castellino, Massimo Rovere, Muhammad Imran Shahzad, Alberto Tagliaferro
	Journal:	Composites Part A: Applied Science and Manufacturing, Volume 87, August 2016, Pages 237–242
	Abstract:	Carbon nanotubes (CNTs) demonstrate remarkable conductive behaviour, which suggests promising applications. Their outstanding properties have been used in the development of CNT–polymer composites as possible alternative materials for various applications, such as flexible electrodes, antistatic coatings and piezoresistive sensors. In our study we focused our attention on the evaluation and modelling of CNT-filled epoxy resin electrical conductivity. We discuss the results with regard to the influence of CNTs dimensions and content. Exploiting the Dijkstra algorithm, we implemented a simulation code which determines the shortest route between electrodes in the polymer. The longer the path inside the polymer, the more non-conductive the composite becomes, since polymer resistivity is orders of magnitude higher than that of CNTs. We compared these simulated results with experimental data obtained at several wt% and found a good correspondence between modelling and experimental results.
	Database:	ScienceDirect

5	Title:	Three-dimensional needle-punching for composites – A review
	Author:	Xiaoming Chen, Li Chen, Chunyan Zhang, Leilei Song, Diantang Zhang

Journal:	Composites Part A: Applied Science and Manufacturing, Volume 85, June 2016, Pages 12–30
Abstract:	The current literature on three-dimensional (3D) needle-punched composites tends to address the aspects of preforms fabrication and composites characterization respectively. This paper aims to bring together these two aspects to provide readers with a comprehensive understanding of the subject of 3D needle-punched reinforcements for composites. Consequently, this paper contains a detailed outline of the current state of 3D needle-punched technology for manufacturing advanced composite preforms. Properties of 3D needle-punched composites and some of the predictive models available for determining these properties are also reviewed. To conclude, a number of current and potential applications of 3D needle-punched preforms for engineering composites are highlighted, and issues impeding the use of 3D needle-punched composites are also summarized.
Database:	ScienceDirect

6	Title:	Percolation model of reinforcement efficiency for carbon nanotubes dispersed in thermoplastics
	Author:	Zhenyu Jiang, Hui Zhang, Jingfeng Han, Zejia Liu, Yiping Liu, Liqun Tang
	Journal:	Composites Part A: Applied Science and Manufacturing, Volume 86, July 2016, Pages 49–56
	Abstract:	Considerable experimental work on carbon nanotube-reinforced composites has shown that the reinforcement efficiency of carbon nanotubes (CNTs) becomes lower than the theoretical expectation when CNT content reaches a critical value. This critical volume fraction (percolation threshold) is considered related to the formation of percolating network. In this work, a percolation model is proposed to describe the observed sharp decrease in the reinforcement efficiency of multiwalled CNTs (MWCNTs) dispersed in thermoplastics when the CNT content exceeds the percolation threshold. The percolation threshold is estimated via a numerical simulation of randomly curved CNTs according to the statistics on geometrical features of real CNTs. The percolation model, integrated into the Halpin–Tsai equations, is verified using the experimental data of various thermoplastic composites reinforced with MWCNTs. The developed mechanical model achieves a good agreement with the measured moduli of nanocomposites, and demonstrates an excellent prediction capability over a wide range of CNT content.
	Database:	ScienceDirect

7	Title:	Quantitative insights into the integrated supply vehicle routing and production planning problem
	Author:	Fanny Hein, Christian Almeder
	Journal:	International Journal of Production Economics, Volume 177, July 2016, Pages 66–76
	Abstract:	In this work we assess the benefits of an integrated planning approach for the supply of raw material and the subsequent production process. The supply part is concerned with the collection of raw materials from geographically dispersed suppliers, while the production planning part addresses the

	conversion of those raw materials into final products to satisfy customer demand. The proposed model is an extension of the model introduced by Kuhn and Liske (2011) considering dynamic demand and general structures of the bill of materials. We investigate two scenarios: one including raw material inventories at the production site, and the other supposing just-in-time (JIT) supply. Numerical experiments show that substantial cost savings are possible with an integrated planning approach compared to a classical sequential approach. The JIT scenario and situations with a rather low utilization in the production system benefit most from the integration. The proposed supply vehicle routing and production planning problem has a reverse structure unlike the well-studied production-distribution systems. Surprisingly, a sensitivity analysis on the dependency of the cost savings on different parameters show a quite similar behavior for both types of planning problems.
Database:	ScienceDirect

8	Title:	Multi-product inventory model for cold items with cost and emission consideration
	Author:	Ali Bozorgi
	Journal:	International Journal of Production Economics, Volume 176, June 2016, Pages 123–142
	Abstract:	While sharing storage and transportation units is common for many product types, cold items usually have different temperature requirements and as a result, not all items can share a holding/transportation unit. Consequently, the type of products and their compatibility with other products needs to be considered in the inventory model. In this paper, we propose multi-product inventory models for cold items. The models determine the inventory levels that minimize either the cost or carbon-equivalent emissions. We model the compatibility of items as a constraint in the inventory model. To solve the model, we first find an appropriate “family of products” that can share a storage/transportation unit. Then, for each family of products we develop an approximate solution method to determine the order quantity of each product within a family. Numerical experiments demonstrate the solution procedure, and provide managerial insights into cold item inventory policies.
	Database:	ScienceDirect

9	Title:	MODELLING AND SIMULATION OF A MULTI-RESOURCE FLEXIBLE JOB-SHOP SCHEDULING
	Author:	Ba, L.; Li, Y.; Yang, M. S.; Gao, X. Q.; Liu, Y
	Journal:	International Journal of Simulation Modelling (IJSIMM). Mar2016, Vol. 15 Issue 1, p157-169
	Abstract:	Flexible job-shop scheduling problem (FJSP) in the field of production scheduling presents a quite difficult combinatorial optimization problem. Machines are mostly considered to be the only resource in many research projects dealing with FJSP. In actual production, there are many other factors which influence production scheduling, such as transportation, storage and detection. If machines are considered to be the only resource, the problem may not be in accord with the actual production.

	Thus, in order to make FJSP more in line with the real production situation, machines, warehouses, vehicles and detection equipment are all considered to be the scheduled resources simultaneously due to the shortage of flexible job shop scheduling problem in resources. A new mathematical model for a multiresource flexible job-shop scheduling problem (MRFJSP) is proposed. The constraints of the model are presented. The makespan is the main target which will be minimized. A genetic algorithm which includes elitist strategy is proposed to solve the MRFJSP. Due to the complexity of MRFJSP, each key module of the genetic algorithm is redesigned. Finally, the model and algorithm are proved through an application case.
Database:	Academic Search Complete

10	Title:	HYBRID ALGORITHM BASED ON PRIORITY RULES FOR SIMULATION OF WORKSHOP PRODUCTION
	Author:	Zupan, H.; Herakovic, N.; Starbek, M.; Kusar, J.
	Journal:	International Journal of Simulation Modelling (IJSIMM). Mar2016, Vol. 15 Issue 1, p29-41
	Abstract:	The proposed hybrid algorithm is a combination of heuristic algorithm extended with priority rules, discrete event simulation and genetics algorithm. It takes into account 11 different priority rules and scenarios, is based on the assumption that for a realistic workshop scheduling of orders, it is necessary to consider real throughput times of the operations, otherwise the obtained scheduling of orders is not suitable for the industrial environment. The simulation result for the proposed model is the optimal sequence of selected orders for the selected time interval while taking into account three criteria: the minimum flow time of all orders, the maximum average utilization of workplaces, and the minimum waiting time of the orders. Because the mentioned criteria are usually mutually exclusive the advantage of the proposed model is that we can find the optimum with respect to all three criteria. In the paper, an example of the application of the proposed model is shown.
	Database:	Academic Search Complete