ANALYTICAL SIMULATION FOR PRODUCTION MIX OPTIMIZATION OF FLEXIBLE ASSEMBLY SYSTEMS

Hayder Zghair, Industrial and Manufacturing Engineering Department, Kettering University, Michigan, USA (hzghair@kettering.edu)
Ahad Ali , A. Leon Linton Department of Mechanical Engineering, Lawrence Technological University, Michigan, USA
(aali@ltu.edu)
Galia Novakova Nedeltcheva, Faculty of Mathematics and Informatics, Sofia University, Sofia, Bulgaria (g.novak@fmi.uni-sofia.bg)

ABSTRACT

This paper devoted to simulate the production system analytically in the most complicated manufacturing environment; flexible manufacturing automotive system (FMAS), integrate the flexibility of automated resources with the variability of vehicle model (VM) demand among the portfolio in the same FMAS, and mathematically models factorial abilities of the optimization which can be investigated. Offering optimal solutions for running body shop system with a minimal lead time avoiding an overproduction is highly consistent within the return requirements of massive investments. Recently, using a convenience simulation technique that can be precisely approved for predicting is a credential tool in the decision making level of budget. Mix production model (MPM) has been analytically presented characterizing two of mixability sources. Resources processing mix (RPM) and Vehicle producing mix (VPM) have been proposed to simulate the production variability. A correlation approach which can describe both RPM and VPM mathematically has used to optimize the solutions depending on artificial networking technique. The contribution of this research work is to introduce a new depiction of optimizable effected factors for the multiple products assembly systems. Moreover, the approach is an applicable tool for the system performance predication cutting off a time and effort consuming.

Biographies

Hayder Zghair is a Faculty in the Department of Industrial and Manufacturing Engineering Department at Kettering University, Michigan, USA. Mr. Zghair earned B.Sc. in Production Engineering from University of Technology, Baghdad, M.Sc. in Production Engineering from University of Technology, Baghdad. The first Master has been earned in Production Engineering from University of Technology, Baghdad, Iraq. and the second Master was in Manufacturing Systems Engineering from Lawrence Technological University, Michigan, USA. Currently, Mr. Zghair is PhD candidate in Manufacturing Systems Engineering at Lawrence Technological University, Michigan, USA. He has published journal and conference papers. Mr. Zghair has completed E-Learning project with UNISCO. His research interests include Flexible Automated Manufacturing, Robotics, Analytical Modeling & Simulation, and Optimization. He is member of IEOM & IEU.

Ahad Ali is an Associate Professor, and Director of Bachelor of Science in Industrial Engineering and Master of Science in Industrial Engineering in the A. Leon Linton Department of Mechanical Engineering at the Lawrence Technological University, Michigan, USA. Dr. Ali is Director of Smart Manufacturing and Lean Systems Research Group. He earned B.S. in Mechanical Engineering from Khulna University of Engineering and Technology, Bangladesh, Masters in Systems and Engineering Management from Nanyang Technological University, Singapore and PhD in Industrial Engineering from University of Wisconsin-Milwaukee. He has published journal and conference papers. Dr Ali has completed research projects with Chrysler, Delphi, DTE Energy, Ford, GE Medical Systems, GM, Harley-Davidson, International Truck and Engine Corporation (Navistar), National Panasonic, New Center Stamping, Progressive Metal Manufacturing Company, Rockwell Automation, Whelan Co., and Whitlam Label Company. His research interests include manufacturing, simulation, optimization, reliability, scheduling, manufacturing, and lean. He is member of ASEE, IIE, INFORMS, SME and IEEE.

Galia Novakova Nedeltcheva is a chief assistant professor in the Department of Computing Systems at the Faculty of Mathematics and Informatics (FMI), Sofia University. Her scientific interests are mainly in Operations Management, Statistical Quality Control and Performance Measurement. She holds a PhD degree from Politecnico di Torino (Italy) and in the period 2002-2006 Galia Novakova was a researcher and lecturer at Politecnico di Milano. She has about 30 scientific (peer-reviewed) publications in international conference proceedings and scientific journals. Dr. Novakova has performed a postdoc research also in the USA (from 2010 through 2012) in the area of production optimization and financial engineering/investing. She has a significant practical experience as an e-Government adviser (2013), corporate business consultant, project manager in IT Company and marketing and sales manager in the natural-gas distribution sector and pharmaceutical industry. She is currently teaching courses in Cloud Technologies and Architectures (undergraduate course), and in Supply Chain Management as well as Software Development Life Cycle (SDLC) Management in a Master course in e-Business and e-Government at the FMI, University of Sofia.