Process Variability Analysis of License Vehicle Number Plate Production in Nigeria

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Abstract

In Nigeria, license vehicle number plate production is characterized by high variability in process times and inter-arrival times resulting in long job waiting time on queues. The objectives of this paper are to investigate the process variability and evaluate the impact on output as well as to identify assignable variables, estimate variability indices and develop matching solutions for improved performance. The paper adopted method of variability pooling for a job shop operating in a non competitive environment with zero buffered inventory policy. Structured questionnaires were administered on the plant workers. Data collected from the plant production records for 2012, 2013, 2014 and in seven production lines were analyzed. Prior to this study, the coefficient of variation (CV) for Awka, Gwagwalada, Lagos and Lagos State Plants showed that measured variability level of the plant were 0.62, 0.67, 0.60 and 0.78, respectively. Comparatively, results obtained after the study showed a significant reduction in process time, cycle time, machine utilization, queue length and waiting time on queue, leading to increased production rate in all the plants. The main contribution of this work from a process efficiency perspective is the low CV achieved that enables 40% increase in net annual income for each plant.

Keywords: assignable variable, variability pooling, process efficiency, vehicle number plate, machine utilization.

Biography

Dr. Stephen Chijioke NWANYA is currently a faculty staff and senior lecturer at the Covenant University in Ota, Nigeria since August 2015. He began his engineering practice and professional development with a consulting engineering firm, Yaroson and Partners- Consulting Engineers, Kaduna from 1993 to 1995. He has over 16 years of teaching experience in working with the University of Nigeria, Nsukka as faculty staff. His major research interests are in industrial production systems design; production and inventory control; scheduling operations; energy modelling and management technology, all these aim at the development of methods and solutions for national engineering problems.

Dr S. C. Nwanya studied at the following Universities: the Federal University of Technology, Owerri; University of Nigeria, Nsukka; and Universita' Degli Studi di Udine, Italy, obtaining Bachelor of

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He has served in dynamic management positions and provided consultancy on project management to University of Nigeria consultancy Services unit. He is active in many professional bodies and a Registered member of Council for the Regulation of Engineering in Nigeria (COREN).

Dr. Oluseyi O Ajayi is an Associate Professor, and current Head of the Department of Mechanical Engineering at the Covenant University, Ota in Ogun State, Nigeria. Dr. holds a Bachelor of Engineering degree from Obafemi Awolowo University, Ile-Ife (1998), a Master of Engineering in Mechanical Engineering from University of Nigeria Nsukka (2004) and PhD in Mechanical Engineering from Covenant University, Ota Nigeria (2011).

He has published over 40 journal and conference papers. His research interest include Renewable energy and Low Carbon Development; Machine Design; Stress and Failure analyses; Vibration and Acoustics as a condition monitoring; Materials and Corrosion studies, industrial material scheduling and Transportation. Dr. Ajayi has successfully supervised 5 Masters and 3 Ph. D students. He is a member of The Nigerian Society of Engineers. He is a registered engineer with Council for the Regulation of Engineering in Nigeria (COREN).