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Calculating the effect of maintenance human error factors on total cost

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Abstract

Maintenance human error factors (MHF) are the conditions that can lead to a human error in maintenance, and have been widely acknowledged as major contributors to maintenance quality. These factors can have a significant effect on operating costs in industrial settings. However, there seems to be a scarcity of papers that aim to estimate the effect of improving these factors on both the maintenance quality and the total cost. The objective of this research is to provide a comprehensive framework to estimate this effect. The proposed framework utilizes a simulation model to establish the total cost associated with a preventive maintenance interval. Our simulation case model consists of three systems in a series, each system consisting of two or three major components operating in parallel where one or two components must be operational at all times. A key feature of our simulation model is that we estimate the probability of component failure based on real failure data, integrated with MHF survey results. By using this simulation model the effect of modifying the MHF on total cost can be estimated. We believe

that our framework can enhance maintenance quality and reduce total cost by recognizing MHF that should be improved.

Keywords
Maintenance human factors, Fuzzy logic, Fuzzy subsethood, Simulation model

Biographies

Rogelio Emmanuel Jauregui Miramontes is a PhD candidate at the University of Toronto. He has 13 years of experience in industry. His research interests include simulation, optimization, reliability, maintenance scheduling, and human factors.

Yuri A. Lawryshyn is currently a fulltime Associate Professor. Yuri Lawryshyn received BASc and MASc degrees from the University of Toronto in Mechanical Engineering, a PhD from the Department of Chemical Engineering and Applied Chemistry at the University of Toronto, an MBA from the Richard Ivey School of Business (University of Western Ontario) and a Financial Engineering Diploma from the Schulich School of Business (York University). After spending over 10 years in industry, Yuri joined the Centre for Management of Technology and Entrepreneurship (CMTE) at the Faculty of Engineering at the University of Toronto as a faculty member. The CMTE is primarily sponsored by the top Canadian banks and is focused on bringing leading edge problem solving and research innovation to the Canadian Financial Services Industry (FSI). Since joining the CMTE, Yuri has supervised over 60 projects related to the FSI including topics related to financial modelling, trading, econometrics, customer analytics, operational risk, cyber security and FinTech. Yuri specializes in the area of numerical modelling, including financial modelling, and real options analysis especially as it applies to managerial decision making.