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Simulation Analysis and Optimization of a Quality Inspection and Engineering Services Company

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Abstract

Simulation is an imitation of the occurrences of events in a system that allows a system to be modeled & analyzed to evaluate and develop a good-performing system. The paper uses discrete event simulation (DES) to model the current system, and then modifications to that system are made using Arena software. This paper analyzes bottlenecks in various quality inspection and engineering services processes, capacity, constraints, and evaluates the plant's performance. Once the model is developed and assessed, different development scenarios will be used for improvement.

Keywords
Discrete Event Simulation (DES), Arena, Input Analyzer, Process Analyzer.

Biographies
Fayed Mohammed Akbar is a System Test Engineer at Valeo North America and a graduate student enrolled in the Master of Science in Engineering Management Department at Trine University, Allen Park, Michigan. He earned a bachelor's degree in Mechanical Production Engineering from Osmania University, India and a Master's in Automotive Engineer from Lawrence Technological University, USA. While an undergraduate, he actively was a member of the Society of Automotive Engineering. He worked as an Autonomous Vehicle Support Specialist for Waymo. He also worked as a Process Engineering for PTI Quality Containment Solutions LLC. He has done various research projects on the synthesis of nanoparticles and a US patent pending in Autonomous Maneuvering of Vehicle into Service Station.

Ahad Ali is an associate professor and director of industrial engineering programs (BSIE & MSIE) and director of a graduate certificate in Lean Six Sigma at A. Leon Linton Department of Mechanical, Robotics, and Industrial Engineering of the Lawrence Technological University (LTU), Southfield, Michigan, USA. He established the Siemens Electro-Matic Industrial Engineering Lab at LTU. Dr. Ali was the primary author of the ABET self-study report of the BSIE Program at LTU in 2022. He earned a BS in Mechanical Engineering from Khulna University of Engineering and Technology (KUET), Bangladesh, a Master's in Systems and Engineering Management from Nanyang Technological University, Singapore, and a Ph.D. in Industrial Engineering from the University of Wisconsin-Milwaukee, USA. Dr. Ali was an Assistant Professor in Industrial Engineering at the University of Puerto Rico - Mayaguez, a Visiting Assistant Professor in Mechanical, Industrial, and Manufacturing Engineering at the University of Toledo, and a Lecturer in Mechanical Engineering at the Bangladesh Institute of Technology, Khulna. He received an Outstanding Professor Award from the Industrial Engineering Department, University of Puerto Rico -Mayaguez. He has published 75 journal papers and 150 conference papers. Dr Ali conducted research projects with Chrysler, Ford, DTE Energy, New Center Stamping, Whelan Co., GE Medical Systems, International Truck and Engine Corporation (ITEC), and Rockwell Automation. His research interests include manufacturing systems, quality, lean, six-sigma, simulation, artificial intelligence, supply chain, and optimization. He supervised 11 doctoral students

in Doctor of Engineering in Manufacturing Systems (DEMS). He is the Founder and Chief Executive Officer (CEO) of IEOM Society International. Dr. Ali serves as a Conference Co-Chair of the International Conference on Industrial Engineering and Operations Management. Dr. Ali organized IEOM conferences around the globe on six continents including Dhaka, Kuala Lumpur, Istanbul, Bali, Dubai, Orlando, Detroit, Rabat, Bristol, Bogota, Paris, Washington, DC, Lima, Johannesburg, Bangkok, Pilsen, Toronto, Costa Rica, Monterrey, Sao Paulo, Riyadh, Manila, Melbourne, New Delhi, Sydney, Augsburg, Tokyo, and Muscat. He is an associate editor of the IJIEOM.