

# **Optimization of an Asynchronous Manufacturing Production System Incorporating Mixed Operational Cycle Time Variation**

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## **Abstract**

This applied research will be conducted on a machining line used to produce cases for vehicle automatic transmissions. This operation was chosen due to its constraint state within manufacturing process. The process consists of single and parallel path operations with highly automated part routing capabilities. Complexity of the system generates multiple factors that contribute to the performance. This research seeks to optimize an asynchronous manufacturing production system incorporating mixed operational cycle time variation. Utilizing software simulation in conjunction with algorithm strategy for part routing an actual optimal solution will be sought. Solution will integrate algorithm part routing, actual equipment cycle time variation, schedule maintenance tasks, and breakdown recovery within scenario decision analysis. The research goal is to discover innovative strategies for balance decision options for particular manufacturing events. Quantify effects of equipment cycle time variation to upstream and downstream performance. Discover key input factors that minimize system recovery time to baseline performance after equipment breakdown. Manipulate equipment preventive maintenances tasks to provide strategic deployment during normal production schedule that deliver the least impact to throughput. This research will quantify effects and discover key factors to consider for optimization of throughput.

## **Biography**

**Saso Krstovski** is working at Ford Motor Company as a Test Engineer since 2010. Mr. Krstovski is detail oriented and data-driven engineer with over 20 years of manufacturing experience. He is equipped with diversely skilled at problem identification and resolution within in early stages to avoid time/cost expenditures. His expert level skills are in information technology, engineering, test and manufacturing systems. His background ranges from supervision to engineering. Mr. Krstovski held several different engineering discipline rolls within Ford. He has extensive six sigma knowledge inside and outside of Ford organization. Mr. Krstovski collaborated with education sector on manufacturing systems projects and ideas on several occasions. In the process of pursuing an advance degree in manufacturing systems. He is a doctoral student at the Doctor of Engineering in Manufacturing Systems (DEMS) at Lawrence Technological University. Mr. Krstovski has Master in Electrical Computer Controlled Systems from Wayne State University. He has published papers and scientific articles.

**Ahad Ali** is an Associate Professor, and Director of Master of Engineering in Manufacturing Systems and Master of Science in Industrial Engineering in the A. Leon Linton Department of Mechanical Engineering at the Lawrence Technological University, Michigan, USA. 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, Ford, New Center Stamping, Whelan Co., Progressive Metal Manufacturing Company, Whitlam Label Company, DTE Energy, Delphi Automotive System, GE Medical Systems, Harley-Davidson Motor Company, International Truck and Engine Corporation (ITEC), National/Panasonic Electronics, and Rockwell Automation. His research interests include manufacturing, simulation, optimization, reliability, scheduling, manufacturing, and lean. He is member of IIE, INFORMS, SME and IEEE.