

## **Line Balancing in assembly line. A case study.**

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### **Abstract**

One of the more common problems in a manual assembly line is the difficult to balance the operations, dealing with different concerns as the way to distribute operations and to accomplish takt times. The complexity of assembly operations also affects the inequity of the workstations' time and generates non value added activities revealed in the total cycle time. The manufacturing plant of this case study produces bus chassis in a very manual assembly operation, and has two different assembly lines: one for urban chassis production (UC) and the second one for foreign chassis production (FC). The purpose of this research paper is to reorganize the job in the workstation for a better use of headcount looking forward to make a 20% reduction. In order to achieve this paper's main objective, the research team used a Lean Six Sigma approach and DMAIC methodology. The activities completed for this case study generated a new operations balancing proposal reducing and eliminating the non-value added activities using Kaizen. This paper is relevant for operations management professionals since it represents one of the most studied issues in manufacturing assembly lines, and provides an integrated approach combining different tools to solve this problem in a multinational company.

### **Keywords**

assembly line, value added, line balancing, DMAIC, Lean Six Sigma.

### **Biographies**

**Michelle Eugenia Sánchez Barrientos** is a fourth year Industrial Engineering student at Universidad de Monterrey in San Pedro Garza García, Nuevo León. She currently has a 50% academic scholarship and is part of UDEM's Honors Program "Líderes Plus" where only the 1% of the entire class is admitted, this program requires a social development project that benefits a local community. Studied abroad in Konstanz University in Konstanz, Germany and has worked on two consulting projects as a Junior consultant one in Criotec and the other in FEMSA Comercio, where she also was an intern in 2016.

**Valeria Argumedo Hinojosa** is a bachelor student at Universidad de Monterrey, San Pedro Garza García, Nuevo León, coursing her fourth year of Industrial Engineering. Has worked in two consulting projects in Criotec S.A. de C.V. and FEMSA Comercio, where she also worked as intern in 2016. During her studies, she was part of the Institute of Industrial Engineers student chapter, where congresses for students were held. Participated in the summer course "Marketing of Services" in Barcelona, España.

**Fabiola Mercedes Arango García** is a fourth year industrial engineering student, currently she has an academic scholarship in her bachelor's degree of 90%. For six months she studied abroad in Caceres, Spain; where she took business subjects. In 2016, she participated in the "Lean Challenge" competition organized by General Electric. As professional development, she has done two consulting projects during her studies, one in Heineken Mexico

Company and the other in General Electric Industrial Motors; in which she did an internship. In 2015, she worked in FEMSA Comercio as an internal analyst intern. During her studies, she was member of two student chapters: Institute of the Industrial and Engineering (IIE) and American Society for Quality (ASQ).

**Teresa Verduzco-Garza** is a Researcher Professor at the Industrial and Systems Engineering School in University of Monterrey (UDEM) in Mexico. She received a BS in Industrial and Systems Engineering in 1998, an MS in Business Administration in 2005, and a MS in International Commerce in 2006 at UDEM. At the moment, she is a PhD Candidate in Management focused on logistics and supply chain operations at the Autonomous University of Nuevo León (UANL) in Mexico. Her expertise focuses on Logistics Clusters for Competitiveness, Operations Management, Supply Chain Operations, and Soft Systems Management. Prior industry experience includes 12 years improving enterprises performance through project management and strategic planning. She is an active member of the American Production and Inventory Control Society (APICS) and The Competitiveness Institute (TCI). She has published and presented her work at international forums like IISE World Conferences, TCI Global Conferences, SISE World Conferences and other regional conferences.

**Jesús Vázquez Hernández** is a Ph.D. Professor & Business Consultor Professional with more than 15-year experience in Operations and Supply Chain Management. Proven record of success leading Supply & Demand Chain strategy projects across multi-cultural teams, implementing business solutions and process improvement, with a TLS (TOC + Lean + Six Sigma) mindset. Strong people management capabilities, team leadership and cross-team collaboration approach. Key strengths in analytical thinking, problem solving and people development skills.

**Fernando Gonzalez Aleu** is an Associate Professor at the Universidad de Monterrey (UDEM) in México. He received a BS in Mechanical and Management Engineering at UDEM, a MS at ITESM in 1999, and both an MS and PhD in Industrial and Systems Engineering from Virginia Tech in 2015 and 2016, respectively. His research focuses on the applications of continuous improvement projects. Prior industry experience includes 15 years implementing quality systems, environmental systems, and management systems. He is member of the Institute of Industrial and Systems Engineers, the American Society for Engineering Management, and the American Society for Quality.