

Improvement of the RNP in the Application of the FMEA in Automotive Processes

Leonardo Gabriel Hernández-Landa, Azucena M. García-León, Rosa E. Mata-Martinez

Industrial Engineering and Management Area, Facultad de Ciencias Químicas

Universidad Autónoma de Nuevo León

San Nicolás de los Garza, NL. 66451, México

leogabrielhdz@gmail.com, azucenamgl@yahoo.fr, rosy275705@hotmail.com

Abstract

We determine the prioritization of processes and tasks in automotive companies. The methodology of Failure Mode Analysis and Effects was applied, the purpose of the FMEA is to take actions to eliminate or reduce failures, starting with the highest-priority ones in order to efficiently identify all possible failures in a design, a manufacturing or assembly process, or a product or service. The traditional Failure Mode Analysis and Effects methodology was applied to four different processes in the companies of the automotive industry, finding deficiencies in the calculation of the Risk Priority Number. Therefore, the calculation of the Risk Priority Number is modified in the methodology, implementing additional steps, adding a weight to the calculation of the risk priority number. The weighting was determined in the cost function associated with a failure scenario within the process. To do this, the cost of the severity of a defect was calculated, such as the effects on the customer, warranty costs, scrap, etc. Secondly, the cost of the occurrence was determined, which indicates what the company is going through when the defect is repaired. The cost of detecting a failure in the system is applied. Finally, these factors are balanced. Finally, a comparison is made against the traditional methodology to identify the improvement in the prioritization of tasks of failure modes that represent a greater impact on the economy of the company and have a consistent control plan.

Keywords

FMEA, RPN, Priority

Biographies

Leonardo G. Hernandez-Landa holds a BSc. in Industrial Engineering from ITSPe in Veracruz, México and earned his PhD in Engineering from the graduate program in System Engineering at Department of Mechanical and Electrical Engineering, Universidad Autónoma de Nuevo León (UANL). Leonardo is currently a Professor of operations management at Department of Industrial Engineering, UANL in San Nicolás de los Garza, México, where he joined in 2016. Dr. Hernandez' research has primarily focused on methods for solving difficult discrete optimization problems arising in logistic, routing and transportation systems. Previously, he has conducted funded research on vehicle routing problems with accessibility and route design. Dr. Hernandez is a SNI Fellow second highest country-wide distinction granted by the Mexican System of Research Scientists, where he has been a member since 2017.

Azucena Minerva García-León is Full Time Professor (scientist and lecturer) in the Faculty of Chemistry Sciences of the *Universidad Autónoma de Nuevo León*. She is a member of the undergraduate and graduate fields of Industrial Engineering. She is the chair of the program of Master of Industrial Engineering. Since June 2005, he has been working as researcher in the field of process optimization. She got the Applied Economic Philosophy Doctorate degree from the *Université Pierre Mendès France* at Grenoble, France (2004). She received the Industrial Engineering Master degree from the *École Nationale Supérieure de Génie Industriel* at Grenoble, France (2000). She got the Industrial Engineering Master degree from the *Universidad de la Américas-Puebla* at Puebla, México (1996). Finally, she obtained the Industrial Engineering degree from the *Universidad de la Américas-Puebla* at Puebla, México (1994).

Rosa Elena Mata-Martínez holds a BSc. in Chemistry Pharmacist Biologist from Universidad Autónoma de Nuevo León (UANL) in Nuevo León, México and eamed her Master of Superior Education from the graduate program in Facultad de Filosofía y Letras. Rosa Elena is actually a Professor of Chemistry, Materials Technology and

Manufacturing Process at Department of Industrial Engineering and Administration, UANL in San Nicolás de los Garza, México, where she joined in 1992. Ms. Mata Mtz. Research has focused on Education Problems, Company Situations on Engineering Area and Pharmacist Aspects. Ms. Mata Mtz. has a PRODEP (Programa para el Desarrollo Profesional Docente, para el tipo Superior) distinction where she has been a member since 2009. Ms. Mata Mtz has one daughter and lives San Nicolás de los Garza, N.L.