

# An integrated lean approach to Process Failure Mode and Effect Analysis (PFMEA): A case study from automotive industry

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## ABSTRACT

Every automotive company is using ISO/TS 16949 standard for automotive industry. According to this standard of Process failure mode and effect analysis (PFMEA), is obligatory. Also, the application of lean in automotive industry is a trend nowadays. Both, PFMEA and lean have the same main purpose – identification, prevention, and correction of failures during the production process. But, PFMEA have many shortcomings. In this paper, an integrated lean approach to PFMEA for solving specific shortcomings, is presented. This approach is new and it has not been used until now. Lean approach (tools and principles), were integrated in PFMEA. The new approach to solving PFMEA was presented in algorithm form. Some of those lean tools and principles integrated in PFMEA are: Genchi Genbutsu, Kaizen, standardized work, Jidoka, and 5 why. The approach presented was realized in a case study from automotive industry where traditional approach to PFMEA was compared to the new lean approach integrated to PFMEA. Changed and improved conditions were: number of team members, the actions taken, identification of failures, change of Severity (S), Occurrence (O), detection (D) and risk priority number (RPN) values, reduced S, O, D, and RPN values after taken actions, RPN with value over 100, and S, O, D indexes with value over 8.

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## Integriran vitki pristop za analizo vpliva napak v procesu (PFMEA): Študija primera v avtomobilski industriji

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### POVZETEK

Vsako avtomobilsko podjetje uporablja standard ISO/TS 16949 za avtomobilsko industrijo. V skladu s tem standardom je analiza vpliva napak v procesu (angl. PFMEA) obvezna. Tudi vitkost je današnji trend v avtomobilski industriji. PFMEA in vitkost imata enak cilj – prepoznavanje, preprečevanje in popravljanje napak med proizvodnim procesom. PFMEA ima številne pomanjkljivosti. V tem prispevku je predstavljen vitki pristop za rešitev specifičnih pomanjkljivosti metode PFMEA. Pristop je nov in do sedaj ni bil uporabljen. Pristopi vitkosti (orodja in načela) so bili vključeni v metodo PFMEA. Nov pristop reševanja analize vpliva napak v procesu je prikazan v algoritmični obliki. Nekatera orodja in načela vitkosti, vključena v PFMEA so: Genchi Gebustu, Kaizen, standardizirano delo, Jidoka in 5 why. Predstavljen pristop je bil uporabljen v študiji primera v avtomobilski industriji, kjer je bil tradicionalni pristop PFMEA primerjan z novim vitkim pristopom integriranim v PFMEA. Spremenjeni in izboljšani pogoji so: število članov ekipe, izvedene akcije, prepoznavanje napak, sprememba nujnosti (N), pojavnost (P), odkritje (O), število rizične prednosti (ŠRP), zmanjšane vrednosti N, P, O in ŠRP po izvedenih akcijah, ŠRP vrednost preko 100 in N, P, O indeksi z vrednostjo preko 8.

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### PODATKI O ČLANKU

*Ključne besede:*

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