

Evaluation of optimisation methods on the shop floor of a serial production

Patrick Pötters^{1/2,a}, Robert Schmitt^{1,b}

Bert Leyendecker^{2,c}

¹RWTH Aachen University, Laboratory for Machine Tools and Production Engineering,
Steinbachstraße 19, 52074 Aachen, Germany

²University of Applied Sciences Koblenz, Faculty Operations Management,
Konrad-Zuse-Str. 1, 56075 Koblenz, Germany

^apoetters@hs-koblenz.de, ^br.schmitt@wzl.rwth-aachen.de ^cleyendecker@hs-koblenz.de

Abstract

There are a lot of different tools and methods available to optimise shop floor processes. These methods include for example *Poka Yoke*, *5S*, Lean Management, *Kanban* and Total Quality Management. It is a challenge for many companies to transfer these methods efficiently to their production. Besides the difficulty of choosing the right method, the estimation of the effectiveness of these methods remains uncertain.

Currently most employees are not acquainted with the methods mentioned above. What is more, they cannot assess the process efficiency regarding the implementation of these methods. Even experts of optimisation methods are only able to assess the efficiency according to experience. To date, a scientific analysis of a shop floor in series production via a business simulation and the selected optimisation methods does not exist. The following hypothesis is given:

“The effectiveness of selected process optimisation methods can be demonstrated via a developed model in form of a business simulation in a model factory”

To confirm the hypothesis, a model with a business simulation that helps to assess the usage of the optimisation methods on the shop floor was developed. Although this method is scientifically recognised, experiments like this have not yet been undertaken for production processes. Therefore, the purpose of this scientific study is to close the research gap with a systematic analysis of series production with a simulation and the generated data using *design of experiments (DoE)*. To achieve this, the deployment of the optimisation tools on the shop floor is measured and evaluated. As KPIs, lead times of the individual workstations, total lead time, reworking, and inventory costs are measured. The selection of the methods used in this game is based on the prevalence in literature, group discussions and a quantitative survey. Methods used are *Kanban*, *Standard Worksheet*, *5S* and *Poka Yoke*.

Keywords

optimisation methods, business simulation, design of experiments, Lean & Six Sigma