Quality Management 4.0 – Potentials and requirements of a holistic cloud-based approach towards a digital reflected production system

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Abstract

Especially smaller and medium size manufacturing companies in high wage countries struggle to be competitive at international markets. Therefore, the need to differentiate due to unique selling propositions implying maximized process quality and minimized costs is essential to business continuity.

Within this paper, potentials of modern quality management by using Industry 4.0 technologies and approaches are assessed and prerequisites are evaluated. The classic target conflict: 'time – quality – costs' is addressed by a cloud-based web platform offering a broad diversity of real-time data consolidation, data analytics and process optimization-tools resulting in a digital production system. The subsequently called smart service platform (SSP) is accessible for third parties offering their cyber physical tools. The SSP ought to display the consolidated digital mapping of production sites to the human controller and therefore constitutes a solid basis for decision-making.

Expert interviews were executed to identify the status-quo in digitalization and thus deviate potentials. Moreover, a definition of sector specific constraints in relation to operative needs and technical requirements of the SSP is established. Based on resulting key-findings an empirical study was conducted prioritizing industry objectives, requirements and expectation of such technologies. This paper closes with an outlook to a future scenario analysis.

Keywords
Industry 4.0, Quality Management, Smart Service Platform (SSP), Digitalization, Process Insights, Production Systems, Cloud Computing

Biography

Armin Buckhorst is a research assistant and project manager of process optimization problems in mechanical engineering at the Laboratory for Machine Tools and Production Engineering (WZL). Mr. Buckhorst holds a Bachelor Degree in Mechanical Engineering, a Master of Science in Production Engineering both from RWTH Aachen as well as a Master of Science in Industrial Engineering from Tsinghua University in Beijing. His research interests include Manufacturing, Simulation, Optimization, Scheduling, Lean and Quality Management.

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Prof. Schmitt serves as a Member of the Grants Committee on Collaborative Research Centres of the German Research Foundation DFG, as well as Member of the Board of Directors of German Association for Quality DGQ and as a Member of the Advisory Board of VDI/VDE Society for Measurement and Automation Techniques GMA.