

# Chapter 67

## Redesign of the Workplace for Toolmakers Towards Industry 4.0

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### ABSTRACT

*This chapter presents a workspace redesign of a toolmaker position in a tooling industry towards Industry 4.0. In general, the theory is lacking studies that would pinpoint concrete methodology to present the redesign of a company specific workplace in a way that would follow guidelines of the Industry 4.0 systematically. In this research, the authors have primarily focused on a digital readiness and identification of potential areas and tasks suitable for the implementation of enabling technologies. Collected data are based on the case study conducted in a tooling company. The result is a procedure to generate a systematic approach, a roadmap, towards Industry 4.0. To achieve the redesign of toolmaker's workplace, the authors combined the AS-IS state analysis and use Toolbox Industry 4.0. The effects of a redesigned process manifest in reduced laborious, repetitive manual work, errors, and toolmaker workload.*

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## INTRODUCTION

Tooling industry is a highly innovative and labor-intensive industrial sector. Manufactured tools enable the mass production of the products in the various fields of industry. For example, in the automotive industry, there is a need to produce more thousands of pieces of different complexity and specificity to assemble only one vehicle. According to this, the manufactured tools are designed very precise to provide and satisfy the demands of the client. The margin of deviation between pre designed product and final product produced by the tools is measured in tenths of a millimeter. The tooling industry is facing the challenge in terms of precision of the tools and in terms of punctuality, to deliver the products due to date. The lead-time is due to a growing competition and innovative technologies, gradually becoming more and more constrained. According to this, the transformation of production process of tooling companies towards digitalization is essential. The opportunity in European tooling industry lays in radical innovations and implementation of smart technologies. Merely the automation of a production process does not satisfy the demand anymore, making the combination and implementation of novel technologies is necessary. The direction of a solution can be found in the concept held under the term of Industry 4.0. The Industry 4.0 is a concept that describes connectivity and inter communication between different building blocks of production process. Under its auspices, we can assemble the terms Internet of things, that enable connectivity among existing and novel technologies, and big data, that represents large amount of gathered data from where new knowledge can be extracted and further used to build an agile company. Agile company is equipped to respond in a real time to market triggers.

For a planned transition towards industry 4.0, tooling companies need to identify their current state and define the potential target state, as this is the practice in other, less project-oriented companies. For this process, different methods and tools are available. One of the available tools is a Toolbox Industry 4.0, provided by the Guideline industry 4.0. The toolbox is presented as a table, with rows presenting different fields of applications and the columns that present certain development stage (Galaske, Arndt, Friedrich, Bettenhausen, & Anderl, 2018) and effective analytical tool that helps to assess current state and map the potential target states that are on the higher level of a maturity state in terms of industry 4.0 readiness. After mapping the target state, the further steps for rising the maturity state are identified. This procedure leads the user towards reorganization and improvement of examined company systematically. Redesign of a workspace is possible with the combination of existing technologies. Defined current state is a base line for planning the way to industry 4.0. From a toolbox, users can acknowledge themselves with possible further steps to more mature level on Industry 4.0 development scale.

This chapter aims to present the current state, of a toolmaker's workspace and to identify the potential activities within it that can be upgraded with new technologies that enable better production procedures and affect human workforce. This was accomplished with a combination of methods. Maturity model for assessing the digital readiness, synoptic to present the current state and the Toolbox industry 4.0. The comprehensive study was carried out with the coordination presented by the Guideline industry 4.0, which was developed by VDMA with cooperation with the Department of Computer Integrated Design (DIK) at the TU Darmstadt, the WBK Institute of Production Science and the Karlsruhe Institute of Technology (KIT). The current state was assessed based on the partially structured interview with the employees and with the business process modeling methodology.

The obtained current state of a workplace is used to define potential activities within the working process that are applicable for implementation of advanced technologies of team's choice. These technologies are collaborative robots, AGV or augmented reality.

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