Requirements for Education 4.0 and study programs within Industry 4.0

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Abstract
The Industry 4.0 is a term for the new age of intelligent manufacturing which is actually swiftly researched by many researchers and companies. The main vision of Industry 4.0 are smart factories that will be connected by Cyber-physical system. The building blocks of smart factory are the nine foundational technologies – Autonomous robots, Internet of Things (IoT), Big data, Simulation, Horizontal and Vertical system integration, Cloud computing, Cybersecurity, Additive manufacturing and Augmented reality. These nine technology trends will transform production into a fully integrated, automated and optimized production flow. The recruiting of qualified employees and their training in the Education 4.0 framework is one of the important area for Industry 4.0. The framework Education 4.0 is primarily focused on the increasing the qualifications of current employees and training of new employees. But the qualification of alumni is also important because suitable qualified alumni is advantage for the company. The qualification of alumni is result of universities study programs. These programs need to be revised due to the changes in company requirements for Industry 4.0. The job positions needed for the Industry 4.0 were founded in our previous research. These job positions are for example Electronics Technician, Automation Technician, Production Technician, Manufacturing Engineer, Informatics Specialist, PLC Programmer, Robot Programmer, Software Engineer, Data Analyst or Cybersecurity Specialist. The required qualifications and skills are different for each position and these abilities will change after application of Industry 4.0 concept. The abilities of employees will be very important for companies because the controlling or maintenance will require only qualified and highly educated employees. For this reason, the Industry 4.0 will affect not only changes in the labor market but also in education and the companies should collaborate with universities. The qualification of employees could be obtained by the long and expensive company training or by stuuding in suitable study program at the university and short company training. It follows that the concept of universities study programs for Industry 4.0 has to be founded and the study programs need to be revised due to the Industry 4.0. The conception proposal of new study programs reflecting requirements for Industry 4.0 will be contained in the paper. This conception will be also validated by selected company, which provides feedback to the conception.

Keywords
Industry 4.0, Education 4.0, Study programs, Human Resources Management, Qualification

Acknowledgements
This research has been supported by the Ministry of Education, Youth and Sports of the Czech Republic under the RICE – New Technologies and Concepts for Smart Industrial Systems, project No. LO1607 and by the Student Grant Agency of the University of West Bohemia in Pilsen, grant No. SGS-2018-016 “Technology and Materials Systems in Electrical Engineering”and by the ESF project CZ.02.2.69/0.0/0.0/16_015/0002287.

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Ing. Martin Hirman

Martin Hirman was born in 1989 in Pilsen, Czech Republic. In 2008 he graduated at the Secondary School of Electrical Engineering in Pilsen. In 2011 he obtained bachelors degree in Commercial Electrical Engineering at University of West Bohemia in Pilsen. In 2013 he obtained masters degree in Commercial Electrical Engineering at University of West Bohemia in Pilsen, diploma thesis "Optimization stock processes". In 2017 he obtained doctors (Ph.D.) degree at University of West Bohemia in Pilsen, Faculty of Eletrical Engineering, Department of Technologies and Measurement. The topic of his dissertation was "Material and process aspects of components connecting to flexible substrates". Currently he is a member of the Regional Innovation Centre of Electrical Engineering and of the Department of Technologies and Measurement.

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Frantisek Steiner was born in Rokycany in 1973. He was awarded an Ing. (MSc) degree in the field of Applied Electronics in 1996, a PhD degree in the field of Electronics in 2001 and an Associate Professorship in Electrical Engineering in 2008. He is an Associate Professor at the Faculty of Electrical Engineering of the University of West Bohemia. He is the head of the Diagnostics and Testing Engineering Team at The Regional Innovation Centre for Electrical Engineering (RICE). His research fields include diagnostics of electronic assemblies, soldering, replacement of lead-based solder and intermetallic compounds. He has published more than 115 papers and presented 40 contributions in 35 congresses.

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J. Tupa received his MSc (2002) and PhD (2006) in Electrical Engineering from Faculty of Electrical Engineering, University of West Bohemia in Pilsen in Czech Republic. He is a Vice-dean of faculty and Senior Lecturer at Department of Technologies and Measurement. Dr. Tupa is member of executive management at Regional Innovation Centre for Electrical Engineering of the Faculty of Electrical Engineering at the University of West Bohemia in Pilsen. He is also PhD supervisor, reviewer of journal and conference publications and co-organizer of conferences. His research interests include Business Process Management, Quality Management, Risk and Performance Management in Electrical Engineering Industry, Industrial Engineering, Electronics Manufacturing and Diagnostics, Financial and Project Management, Copyrights and patents law, information law and transfer of IPR. Jiri Tupa is responsible for several international research and development projects with industrial and University partners. The project RiMaCon - Risk Management Software System for SMEs in the Construction Industry is one of the important international projects. This project has received funding from the European Union’s Seventh Framework Program for research; technological development and demonstration (2013-2017). The RiMaCon project’s main goal is to implement a collaborative effort to promote the sharing of knowledge and competencies in a long-term strategic research partnership around the development, testing and validation of a cost effective and user-friendly risk management system for SMEs in the construction sector.