Multi-agent environment of cyber and physical production for the Industry 4.0 smart factory

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The task is to create flexible automatic production equipped with cyber and physical systems of industrial purpose. Flexible automatic systems are the base of production of the Industry 4.0 smart factory. The Industry 4.0 smart factory main purpose is to create an item designing component (machine designing) without humans and with technical documentation in electronic way. The Industry 4.0 smart factory production must be studied as a multi-agent environment with some components (agents) in physical machine level and in virtual level.

There is a scheme of multi-agent environment of the Industry 4.0 smart factory and its order how to interact for agents in physical and cyber level. To describe the digital production of a smart factory is done with terms of automatic control digital systems with random delay. To unite cyber and physical systems in a single production helps to create a multi-measure automatic system which functionality is described with equations in vector and matrix form.
Figure 1. General scheme of multi-agent environment of the Industry 4.0 smart factory digital production.
Figure 2. Scheme of interaction of operators and multi-agent environment of the Industry 4.0 digital production.