SYNTHESIS OF SELF-RECONFIGURABLE MANUFACTURING SYSTEMS IN ENGINEERING

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The scientific problem of the synthesis of reconfigurable manufacturing systems (RMS) is considered. Reconfigurable manufacturing systems are an integral part of self-reconfigurable factories in engineering. Self-reconfigurable plants operate on the basis of flexible and advanced lines equipped with RMS. A scheme is proposed for decomposing the requirements of the technical specifications for the design of self- reconfigurable plants in order to determine the particular requirements for individual components of the plant's infrastructure. An algorithm for designing a different class of reconfigurable manufacturing systems is proposed.

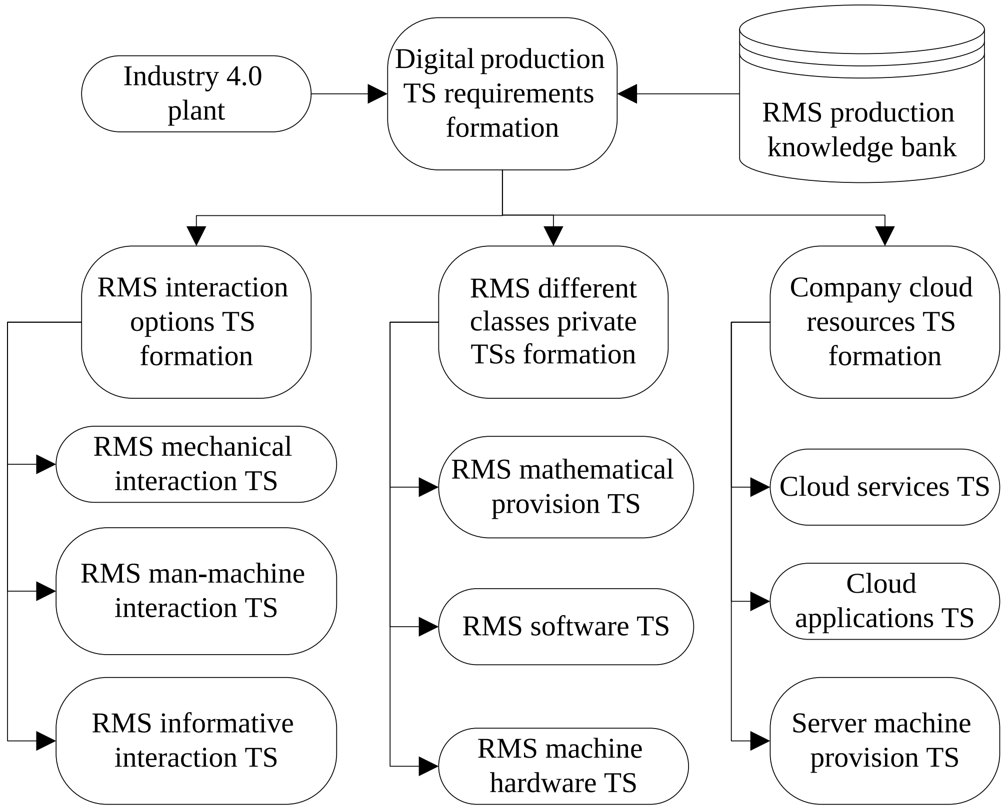

Figure 1. Decomposition scheme of TS requirements for the synthesis project reconfigurable factory for private TS to the elements of infrastructure.

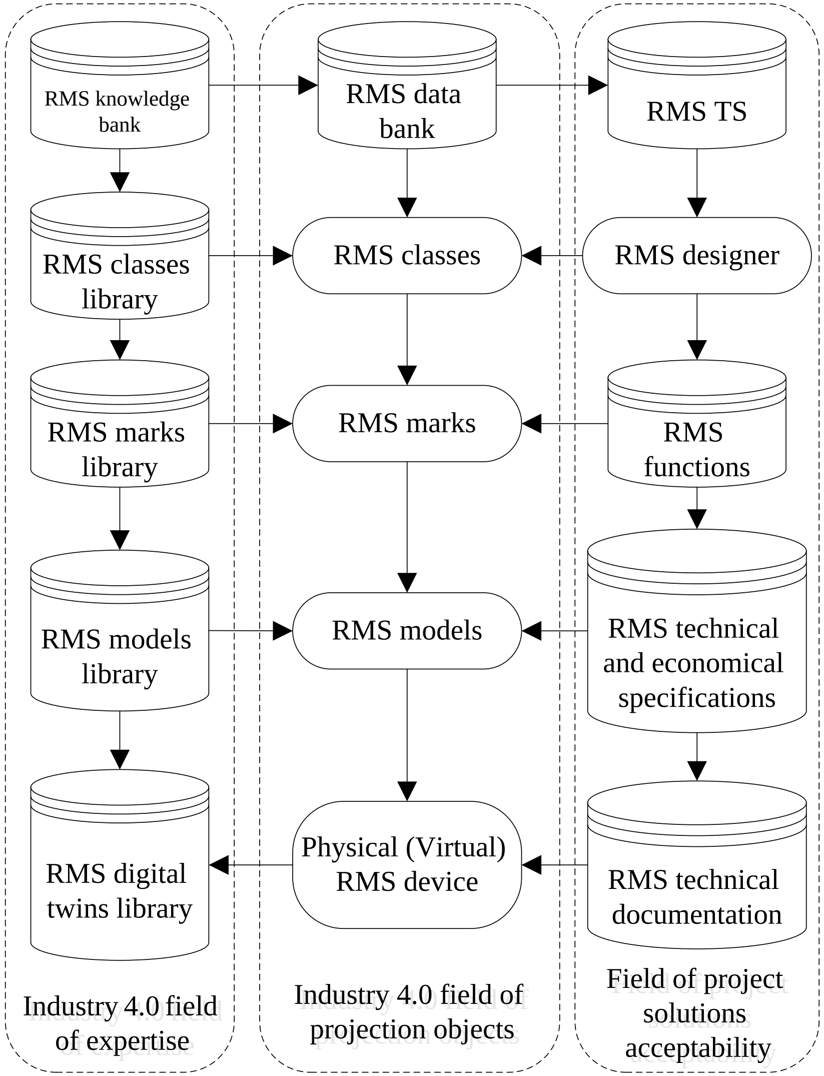

Figure 2. RMS system designing algorithm.

The reconfigurable plant as a design object is characterized by the signs of a complex system:

- multidimensionality of the space of design decisions on the choice of the plant;

- hierarchy of the structure of the RMS, communication environment, virtual environment, etc.;

- RMS multi-connectivity based on the methods of RMS interaction in the process of equipment self-reconfiguration;

- the variety of RMS, focused on the implementation of various manufacture operations;

- multi-mode functioning of the RMS in the process of completing manufacture tasks;

- multichannel communication environment combining RMS, operators and distributed control system;

- multi-criteria, due to the space of indicators characterizing the reconfigurable plant.

The solution of the reconfigurable plant design problem is systemic in nature and is based on general scientific knowledge bases and databases of flexible technologies. A systematic approach to the design of the reconfigurable plant is to implement the following design procedures by the developer:

- study of the reconfigurable plant as a single design object with its inherent performance indicators;

- designing the structure and composition of the reconfigurable plant, identifying the relationships between RMS and their presentation at the level of analytical models;

- assessment of private parameters of the quality of functioning for each RMS;

- coordination of functional and parametric requirements global for the reconfigurable plant and local for RMS performance criteria.