Comparative study of flexible and decentralized agent-based and service-oriented control architectures for production systems

Abstract:

The purpose of this paper is the presentation and comparison of control architectures for the modular factory. In the last few years, service-oriented architectures and agent systems evolved to the most suitable technologies for flexible and versatile production systems which cope with challenges resulting from shortened product life cycles and product customization. However, decentralization as a rising concept to reduce complexity in production systems is often ignored. Therefore, this paper introduces service-oriented and agent-based control architectures which are based on the Production Priority Plan guaranteeing more flexibility and enabling decentralized decision-making in order to react to unexpected events. The architectures are compared in test scenarios derived from future production system challenges. The study demonstrates the great potential of the flexible, versatile and decentralized architectural concepts for production systems by contrast with today's production controls. Furthermore, applications more suitable for a concept due to its specific characteristics are highlighted.

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