

54th CIRP Conference on Manufacturing Systems  
Adaptive self-learning distributed and centralized  
control approaches for smart factories

Oliver Antons<sup>a</sup>, Julia C. Arlinghaus<sup>b</sup>

<sup>a</sup>*Chair of Management Science, RWTH Aachen University, Kackertstraße 7, 52072 Aachen, Germany*

<sup>b</sup>*Otto-von-Guericke University Magdeburg, Universitätsplatz 2, 31904 Magdeburg, Germany*

---

**Abstract**

The increasing application of cyber-physical systems creates a manufacturing environment in which the technical requirements for distributed control approaches, self-learning systems and analytics of previously untapped data are given. While distributed control approaches are capable to evaluate this information locally and react immediately, centralized approaches react inertly to analyzed machine performance data. In this paper, we study the performance and ability to address the ever increasing challenges in industry of both types of control approaches within an established multi-agent based discrete event simulation.

© 2019 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Peer-review under responsibility of the scientific committee of the 54th CIRP Conference on Manufacturing Systems.

**Keywords:** distributed control; smart factory; autonomy; decision-making; discrete-event simulation; multi-agent system; cyber-physical system; Industry 4.0, data analytics, self-learning

---