Using simulation to orchestrate the upskilling and well-being of operators: an application to circular manufacturing systems

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Résumé

The current environmental context is encouraging manufacturers to move towards more sustainable manufacturing systems, such as the implementation of the circular economy in their production practices. In these complex circular processes, which involve putting back into service products that have already had a first life, the tasks to be carried out by the operators are complex and require constant adaptation to the condition of the part being recovered, as well as a wide range of skills. Some processes - such as the cleaning and dismantling phases - can also involve high health risks, particularly musculoskeletal and psychosocial disorders. Faced with these human challenges, many proposed solutions - technological or organisational - have been proposed by researchers, but very few have been backed up by empirical evidence. The ability of digital simulation to test transformative scenarios in the decision-making phases of industrial systems could therefore be valuable in identifying potential solutions for these systems, provided that it allows the human aspects related to learning and health to be taken into account. Some proposals for human-centred simulation have been made, but the limitations of these models are numerous. This communication presents a discrete-event simulation model that takes into account health and competence aspects based on real data. The methodology used, the limitations and the next stages of development are developed in this presentation.

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