Thürer, M., Fernandes, N. O., Stevenson, M., & Qu, T. (2017). On the backlog-sequencing decision for extending the applicability of ConWIP to high-variety contexts: an assessment by simulation. *International Journal of Production Research*, 55(16), 4695-4711. doi:10.1080/00207543.2017.1281462

Abstract:

Constant Work-in-Process (ConWIP) is a card-based control system that was developed for simple flow shops – a lack of load-balancing capabilities hinders its application to more complex shops. In contrast, load balancing is an integral part of Workload Control, a production planning and control concept developed for high-variety environments. One means of load balancing evident in the Workload Control literature is through the use of a capacity slack-based backlog-sequencing rule. This study therefore investigates the potential of the backlog-sequencing decision to improve load balancing in the context of ConWIP, thereby making it suitable for more complex, high-variety environments. Using simulation, we demonstrate that: (i) the choice of backlog-sequencing rule significantly impacts throughput times and tardiness-related performance measures; and (ii) capacity slack-based sequencing rules achieve significant performance improvements over 'classical' ConWIP backlog-sequencing rules. These results significantly extend the applicability of ConWIP. Results from the Workload Control literature however do not directly translate across to ConWIP. The simplified release procedure of ConWIP makes backlog-sequencing based on planned release dates dysfunctional. This negatively impacts the performance of modified capacity slack-based sequencing rules that were recently shown to be the best choice for Workload Control.

Keywords: Constant Work-in-Process (ConWIP), make-to-order (MTO) production, dispatching, Workload Control, backlog-sequencing rule