Assembly processes and
materials supply systems design

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ABSTRACT

Lean production has over the last decades emerged as the most important paradigm for production, with the assembly processes in focus, including the objective to minimize non-value-adding work. Thus, much attention has been on the work of the assembly operator. However, little focus has been devoted to how the new requirements from lean production have been transformed into materials supply systems supporting the assembly processes. Hence, the purpose of this thesis is to contribute to increased knowledge about the relation between assembly processes and materials supply systems design.

A framework is introduced in this thesis, describing how requirements from the assembly processes are transformed by the materials supply system into the actual materials flow. In the results of this thesis, a model structuring requirements in materials supply and assembly processes is proposed, tested, and subsequently different requirements were identified. Materials exposure is introduced as the transition from the materials supply system to the assembly system. Results show that that the materials exposure has a large impact on assembly workstations performance in terms of space needed, non-value-adding work and ergonomics. Further, an experiment showed that the materials exposure factors with the largest impact on picking time were packaging, angle of packaging and height above floor.

Major contributions in this thesis are the identification and structuring of requirements in assembly processes and materials supply systems, and explaining how the materials exposure affects the assembly processes. How this knowledge can be applied in the design of new, or redesign of existing, production systems and materials supply processes in particular, is a managerial contribution.

Keywords: Lean production, production system, assembly, materials supply, materials handling, packaging, materials exposure