DESIGN AND ANALYSIS OF MATRIX PRODUCTION IN SMART PRODUCTION LAB

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ABSTRACT

The production line layout has been a reliable solution to mass production since Ford installed the first of its kind in 1913. For the last couple of decades, the focus has shifted from mass production to mass customization [1]. Many industries have started to experience an increase in product variance and shorter life cycles of products. In order to meet these demands, flexible manufacturing systems have been a topic of interest for many industries. Many of the current manufacturing systems have arrived at a trade-off between product output and flexibility with none of them being a general solution for the manufacturing systems.

The AAU SmartLab is a module-based manufacturing system for research and demonstration. The production can produce a "simplified phone" consisting of a lower- and upper phone case, a PCB and up to two fuses. The mobile phone can be produced in different variants, where the number of fuses or the colour of the cases can be modified. The current layout of the system can be described as a reconfigurable line-layout including a robotic manipulator with a tool changer.



Figure. Current layout setup for AAU SmartLab[2]

Matrix production is a new solution for both creating a high product output, as well as having a high product variance. The three key components of the setup are; (1) cell layout, (2) each cell being multi-functional, and (3) transportation of products realised with small robotic vehicles (e.g. AGVs).

It allows components and products to move through manufacturing independent of production lines. Coupling cells with short changeover times and autonomous movement of goods and products means that manufacturing of products with high inter-product variance is feasible without sacrificing reliable flow and high volume.

This project seeks to investigate the transformation of the AAU SmartLab to a matrix production. By utilizing discrete event simulation and literature study on the subject, the layout of the matrix production will be investigated, and a plan of the transportation will be developed. In the end, an evolution of the different design will be conducted.

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