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Layout Planning and Work Structuring Methods for Parallellized Flow Assembly Work.

Abstract from the Workshop at Conference on Learning and Research in Working Life – Collaborative Experiences, Lund.

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The work structuring methods used for the design of the Volvo Uddevalla final assembly plant were based on the original product structure specification made available by the design department. Trough using a combination of experiments [1, 2] and analytical calculation [3], it was possible to develop and introduce an advanced production system. A design which included non-traditional materials feeding techniques [4], holistic learning principles, parallellized-flow, autonomous work groups, etc. as well as an expressive architecture for the six so-called "product workshops" containing up to eight parallel work groups each.

We were engaged in the design and running-in process taking place over a period of seven years. Although it was a hectic and sometimes frustrating experience the merits of long cycle-time, parallellized-flow production in full-scale were eventually proven.
The fundamental design principle for the shop-floor work was to establish technical and administrative preconditions for creating consistence between materials display on the work station, the work and the description of the work. This implies that there was a need to organize the components according to characteristics of relevance to the assembly work. Thus it is possible to significantly increase the work content, with a realistic learning time.

The implication is that long cycle-time work assumes a prestructuring of information and materials, which is realised in practice by supplying the components to be fitted in some kind of kits. The kitted materials serve both as a work instruction and as a planning instrument, on the basis of which the work group members can continuously survey the status of the work [5].

As testified by our video recordings of the performance in the workshops, the Uddevalla plant had the opportunity to improve its performance even more than what was achieved. We noted that the performance of the work groups was superior, by about 15%, to the assembly times calculated by the production engineers using time-and-motion studies. However, this performance improvement was never fully utilised [6]. Equally important is the extremely good utilisation of space [7] and the delimited need for expensive tools, in contradiction to what was assumed. In some "workshops" it was possible to enlarge the cycle times even more, but this opportunity was not fully used [8].

It is important to note that the Uddevalla experiences conform to accepted theoretical frames of references, although this is neither generally accepted as a success nor fully understood by managements in the automotive industry.

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