

Productivity and optimization of section-based automated lines of parallel-serial structure with embedded buffers

Abstract

Automated production lines of a parallel-serial structure are most productive in the manufacturing area. Designers of automated lines segment into sections with several stations place buffers between the series of sections that enable increasing the productivity rate. The failure of one station leads to stoppage of only one section of the automated line, while other sections continue to work and machine parts are stored or consumed from buffers. In real production condition, the capacity of a buffer is limited, and a buffer can compensate only in part stoppages of sections in an automated line. This article represents a new analytical approach for calculating the productivity rate of the section-based automated line of a parallel-serial action with embedded buffers of limited capacity. It enables to solve the problem of structural optimization of the line by the criterion of a maximal productivity rate, which yields the optimal number of serial and parallel stations, and the number of sections.

Keywords

Automated line; Optimisation; Productivity; Sections