

A HEURISTIC METHOD OF RANDOM SEARCH FOR TASK OF COORDINATION

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In modern conditions in the industrial enterprises occur objective changes in their functioning, which is associated with an increase in their size and complexity. This complexity lies in complex modeling, complex spatial structure, and complex hierarchical structure. The complexity appears due to interconnected subsystems, the large number of variables and constraints, and the autonomous management of each subsystem, this often leads to numerous problems and generates a high degree of uncertainty in management decisions. In this context, the overall efficiency of production lines is a priority. Thus, to achieve an overall efficiency of production lines is necessary to coordinate the interactions.

Let's study the coordination in a dairy plant manufactures three products, which are stored in a temporal area. For the transport of the products, there is available one mechanism. The presence of only one mechanism makes it very difficult the parallel operation of all the lines and, therefore, it leads to increase of downtime and loss of profits.

Broad classes of problems, including the coordination of activities of production processes, are solved by search methods. Analytical methods, such as gradient methods, do not work well when the search space is multidimensional. Either because they get stuck in local optima or because they do not converge in a reasonable computation time. For this reason, many researchers prefer heuristics techniques for searching global optimal solution. The existent more effective methods include mechanisms that take advantage of the accumulated knowledge about the criterion of efficiency. This paper presents a method to solve the task coordination of distributed industrial objects. The objective of this method is to find an optimal solution within the "search space," determined by a set of constraints.

The proposed method to improve the coordination of the processing lines consists of: a) a technique of sampling and reconstruction of function, which meets the criteria of efficiency, b) a heuristic method of random search in the feasible region, and c) a heuristic search method to optimize local extrema. The method was applied to obtain the operating conditions in parallel for a specific case.

The results were obtained with 250 assessments of the optimization criterion. With a simple random search method, to obtain similar results, requires no less than 500 evaluations of the optimization criteria.

This method of coordination can be adapted to other processes requiring interrelated resource allocation and synchronization.