UDC 658.7.07

Viacheslav Ivashchuk (Kyiv)

THE MODEL OF RESOURCE RENEWAL FOR MULTICOMPONENT PROCESSES WITH DYNAMICAL APPLIANCE

It is necessary to provide the expected costs [1] dI_{prod_i} for the implementation of technological process, optimization of buffered balance $V_{res\_R_{sklad}}$, when take place the change of tasks for production line. The ability to parametric and structural changes must be provided by appropriate volume of resources for the implementation of flexibility for the production system. Some works [2, 3] consider the concept of ensuring the control task with observable resource consumption, but it do not provide a correct solution for the conditions of variable demand for resources, as a consequence of the variable vector of assortment spends, so that *the resource renewal for changeable conditions of the complex resources for a group of products remained a pressing challenge*.

Objective: The task of determine the required volume $V^*_{res\_R_{sklad}}$ and method of updating each resource remained for provide a resource-related group of processes as actual challenge.

The task of optimizing reserves $V_{res\ -R_{sklad}}$ of inventory resources R_{sklad} is considered at the level of forecasting of the production program, the term $\tau^*_{ag\_prod\_\Sigma}$ of which is determined by the calendar production period of the product. The changes of dynamics of the resource demand:

$$F^*_{res\_j} = \int_{V^*_{res\_j}}^{F_{prod\_i}k_{Fres}\tau_{ag\_prod\_i}+V^*_{res\_j}} \left(x - V^*_{res\_j}\right) f(x)dx .$$

Estimation of investments, which determines the general dynamics of losses

$$dI = dI_R \dot{F}_{prod\_ch\_max} V^{-1}_{res\_\Sigma} + 0{,}5 dI_{sklad} V_{res\_\Sigma} + I_{sklad}\left(V^*_{res\_j} - F_{res}(x)\right) + \\ + dI_{outsour} F^*_{res\_j} \dot{F}_{prod\_ch\_max} V^{-1}_{res\_\Sigma}$$

minimizes the amount of resource renewal as

$$dIdV_{res\_\Sigma} = \frac{dI_R \dot{F}_{prod\_ch\_max}}{V^2_{res\_\Sigma}} + 0{,}5 dI_{sklad} V_{res\_\Sigma} + \frac{dI_{outsour} F^*_{res\_j} \dot{F}_{prod\_ch\_max}}{V^2_{res\_\Sigma}} .$$

The critical volume for implementing the renewal request is determined by the size of the investment

$$dI_{R\_max} = dI_{sklad} - \frac{F^*_{res\_j}\dot{F}_{prod\_ch\_max}}{V^{-1}_{res\_\Sigma}} \int_{V^*_{res\_j}}^{F_{prod\_i}k_{Fres}\tau_{ag\_prod\_i}+V^*_{res\_j}} f(x)dx ,$$

where the level $limV_{res\_j}$ for which the order is placed again is the function f_{Tup} of the time period between the placing of order and its execution

Conclusion. Thus, taking into account the constant time of resources renewal, the dynamics of consumption and the estimation of number requests for supplies is determined the effective use of logistic supply chains and the composition of resources of the technological complex for the tasks of multi-product production.

List of references:

1. Meng, Y.A., Currier P. System Efficiency Approach to Parallel Hybrid Control Strategies : SAE 2016 World Congress and Exhibition : SAE Technical Paper, 2016. P.26–37
2. Modeling and optimization of processes for development of production systems taking into account the use of external resources and effects of usage : monograph / T.M. Borovskaya and etc. Vinnitsa : Vinnytsia National Technical University, 2009. 255 p.
3. Qiu R., Wang Y. Supply chain network design under demand uncertainty and supply disruptions: a distributionally robust optimization approach. Scientific Programming. 2016. Vol.15. P. 4–19