



Modified Criterion for Economic Efficiency Estimation of Heat Pumps

Stanislav Boldyryev^a, Andrey Garev^a, Oleg Ilunin^a, Anatolij Shamraev^{*b},
Olexandr Selyakov^{*b}, Olena Leshchenko^{*b}, Petro Kapustenko^a

^aAO "SODRUGESTVO – T" Company, per. Krasnoznamenny, 2 ,off. 19, 61002 Kharkiv, Ukraine, e-mail:
petro.kapustenko@kpi.kharkov.ua

^bKharkiv National University of Radio & Electronics, av.Lenina,14 ,off.33z, 61166 Kharkiv, Ukraine, e-mail:
Shamraev.Anatolij@gmail.com

The cost-effectiveness of coal mine waste water low potential heat utilization and integration in the enterprise local heating network by the bivalent parallel scheme is investigated. It is shown that the additive criterion of economic efficiency is not always sensitive to the target value because of the reason of non-linear coupling between the arguments of the target function. Several cases were considered from the viewpoint of cost-effectiveness criterion. Moreover, the arguments of the target function are also non-linear, depending on technological parameters of the heat pump (HP) equipment. As a more effective criteria were proposed the modified canonical additive-multiplicative function and Kolmogorov-Gabor polynomial function. It was used to obtain the generalized multivariate estimation of alternatives in two stages procedure.

Synthesis of complex structured systems, which include HP, leads to the necessity of solving the vector optimization problems, which are also called multicriterion. Assessment of effectiveness is required for a variety of operations, projects and processes, performance indicator should link the basic indicators, which are common for any operation and processes. It's a variety of estimation of input and output operations. In the general case, the efficiency is a cross-cutting measure. When replacing the estimations of the cost indicators performance indicator turns into a tool of estimation of economic operations.

The methodology of the rational choice of alternatives states that the design of the HP can be formally represented as a process of narrowing the set of alternatives decisions on the basis of the available information. The task of searching for effective and optimal parameters in the set limits belongs to the tasks of parametric optimization.

The effective criteria, which aggregate in all the requirements and objectives of the technical system are proposed. The data obtained using the proposed criteria are analyzed. The case study of a bivalent parallel circuit integration compressor HP of «water-water» type to the existing heating system for heat generation for heating of the trunks of mines was observed.

The results shows that the additive criteria C_{ADD} is practically does not distinguish between alternatives, the criterion C_{AMc} is more sensitive and has more high speed in comparison with the basical C_{AMM} . The criteria C_{PKGm} and C_{PKG} due to its cumbersome are in the same class of accuracy and speed searching. Approach, proposed for the synthesis of the criterion C_{AMc} , also can be extended for economic efficiency estimation Local Heating Networks in general and can be applied for the assessment of mathematical models adequacy to the real systems. The long-term objective for this research direction is the software application development of expert procedures with clustering factors on formal signs and the calculation of factors weighting coefficients using the AHP method. For the future work, computerized procedures of effective implemented solutions searching should also be investigated and developed.

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