Solving Multiple Tour Multiple Traveling Salesman Problem with Evolutionary Programming

László Kota[1], <u>Károly Jármai</u>[2]

[1] University of Miskolc, Institute of Logistics, Hungary, altkota@uni-miskolc.hu;
[2] University of Miskolc, Institute of Logistics, Hungary, altjar@uni-miskolc.hu;

Abstract

Nowadays in the field of globalized production and service industry the significance of the tightly integrated logistic systems are increasing. In the service industry the technical inspection and maintenance systems has a great importance, because they provide safety and reliable operation of production and service facilities. The reliable, accident free, and economic operation require periodic technical inspections and maintenances. In these systems the inspection generally require specialized knowledge, sometimes it even requires special certificate. At elevators, which inspection and maintenance are very important from the aspect of life protection, there are governmental regulations available.

The paper describes a single phase algorithm for the fixed destination multi-depot multiple traveling salesman problem with multiple tours (mmTSP). This problem widely appears in the field of logistics mostly in connection with maintenance networks. In the first part we show the general model of the technical inspection and maintenance systems, where this problem usually emerges. We propose a mathematical model of the system's object expert assignment with the constraints like experts minimum and maximum capacity, constraints on experts' maximum and daily tours. In the second part we describe the developed evolutionary programming algorithm which solves the assignment, regarding the constraints introducing penalty functions in the algorithm. In the last part of the paper the convergence of the algorithm and the run times are presented.

Keywords: heuristics; optimization; evolutionary programming.