

Comparisons of optimal management of the movement of the road train with minimal fuel consumption in all three technical and operational parameters show that the distribution of speeds in sections of the maximum relative performance criterion has the following advantages) in comparison with the movement with a maximum speed of economical gear:

- At movement of a road train carrying a load of the motorway Sofia-Plovdiv fuel consumption reduced by 12l, an increase of the duration with 16min. When traveling on a road train without load fuel economy is 2,5l for Route 1 (motorway) and 3l for Route 2.

- When travelling on a road train with a cargo on the motorway from Plovdiv to Sofia fuel economy is 14l, but without load - 6l. The duration in the first case is increased by 14 min, and in second - 12 min.

- For one turnover Sofia-Plovdiv – cargo (route 1 - motorway) and Plovdiv-Sofia (route 2) without cargo, fuel consumption decreased by 25l in relation to the turnover in the motorway and traffic with a maximum permissible speed of the gear, allowing the minimum fuel consumption. The duration in this case is increased by about 1 hour.

Fuel consumption in the transport of freight on a route 2 Sofia-Plovdiv is identical for the three tested techno-operational parameters. This also applies to the opposite direction, as well as in the case of motion without load.

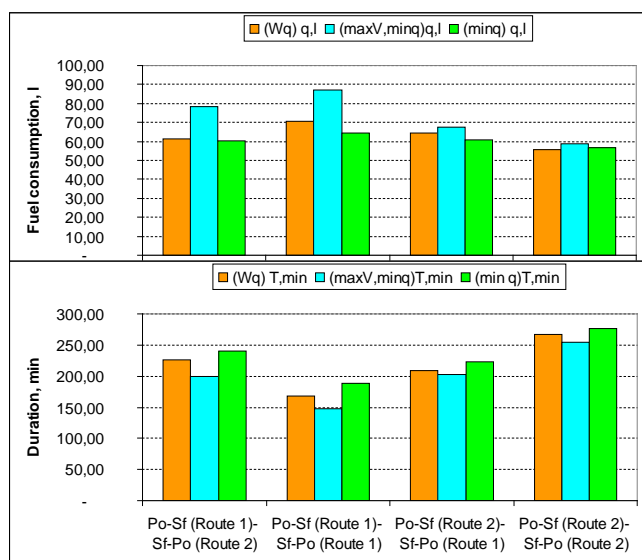


Fig.28. Comparison of total fuel consumption and duration (Combined services Plovdiv-Sofia-Plovdiv)

6. Conclusions

The new in the research approach is the modeling of the movement of a road train with minimum fuel consumption by applying the graph theory and optimization of the way of the speed in different sections of the route selected by the technical and operational criteria. The use of flow-algorithms makes possible to take account of the capacity of the routes of transport. The model can be applied to traffic management and other modes of transport.

Investigation gives reason to make the following important conclusions:

- The highest fuel consumption is obtained by optimization criteria maximum speed and minimum fuel consumption. In this case the duration is minimal.

- Optimal distribution of speeds of movement of a road train in criterion a minimum fuel consumption increases the duration in comparison with the other two criteria.

- Determination of the speed criterion relative performance reduces fuel consumption by about 20%, at a minimum increase of the duration.

- The most important is the speed of the carriage of easily perishable goods. In these cases, proper optimization criterion is the maximum speed and economical gear.

- In transport which allows a minimum increase of duration at the expense of reduced fuel consumption, without damaging the period of delivery, it is recommended the management of the movement of the road train as relative performance criterion.

- An alternative route is necessary to assess the choice of the optimum, depending on the type of cargo and the strategy of the transport company.

- The choice of techno-operational parameter optimization depends on the purpose of the carrier.

For the practical implementation of the methodology is appropriate to the application of GPS system in the road train that to inform drivers for optimum speed of movement within the previously selected techno-operational optimization criterion in each section. For the implementation of the optimal movement is necessary tracking by dispatch Center. Through the GPS system can monitor the position of the vehicle and to receive feedback on the speed, fuel consumption, the position, travel tolerances, over speed and unplanned stop. These data may be used for the adaptation of business processes and efficient freight transport in the transport companies.

7. Acknowledgments

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