

С.Сейфуллин атындағы Қазақ агротехникалық университетінің 60 жылдығына арналған «Сейфуллин оқулары– 13: дәстүрлерді сақтай отырып, болашақты құру» атты Республикалық ғылыми-теориялық конференциясының материалдары = Материалы Республиканской научно-теоретической конференции «Сейфуллинские чтения – 13: сохраняя традиции, создавая будущее», посвященная 60-летию Казахского агротехнического университета имени С.Сейфуллина. - 2017. - Т.1, Ч.5. - Р.3-5

THE POSSIBILITY OF USING SURPLUS POWER OF LOCOMOTIVE TO SUPPLY THE PASSENGER CARRIAGES

Akimbek G.A.

Noncommercial Joint - Stock Company "Almaty university energetics and communication" department "Heat Engineering Installations, Almaty.

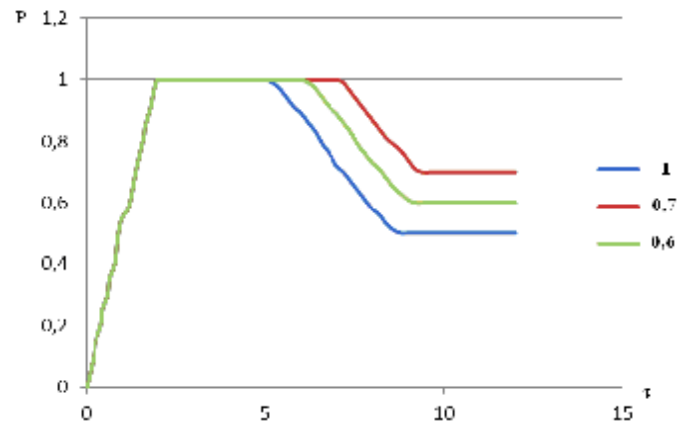
Providing the comfort conditions on the roads of passengers has the special value in countries with large territory. It is contingently used on planes and busses, trains between cities in countries with compact territory, in this connection when we travel by train the condition of the passage should be as convenient as by bus and by plane. When we take a long way to travel (to Kazakhstan, Russia and etc.) we have to live in a carriage and in accordance with it, the condition should be as convenient as in a hotel that demands providing the different types of energy.

Last year different charts were used to provide the different types of energy of passenger carriages. For example, in composition with old charts the electricity is carried out by their own generator or accumulator placed under carriages. Thus for the rotation of generator, the energy got from electric engines of locomotive wheels and generator of locomotive was used. As a result on the generators of carriage an approximately of one third from the initial current of generator of locomotive was repeatedly created. Load of generator, its reducing gear and accumulator of reserve feed approached to two tons, 15 carriages are approached weight of one additional carriage and increased the expenses on traction approximately on 10- 15%. Providing the electricity was produced from a reserve accumulator of only regular illumination (a conditioner is disconnected in summer).

Thermal energy (on the chart of providing the energy of passenger carriage) was produced from the individual boiler room of every carriage, mainly on coal (storage and serve, that over on a caldron was brought to substantial contamination of platform of carriage). This chart of heating became a regular temperature in a carriage (created additional discomfort for a passenger), although during some modernization (for example, with creation of the system with adulteration of external cold air, through the special ventilator (electrically-driven) could provide adjusting of temperature in every compartment.

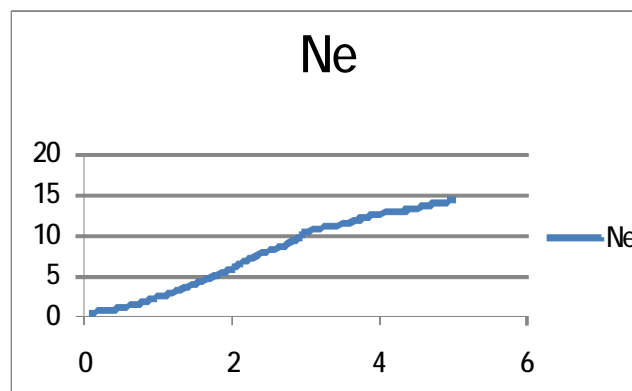
On the other chart of providing the energy of passenger carriage (on Talgo, on the Chinese carriages, partly on the Ukrainian carriages) the electricity which is used on heating, on domestic and computer technique and etc. is produced by the own generator placed in a separate carriage (as it has already been mentioned above that results increased to 10 -15%). In this case all "set" of discomfort of passenger is practically removed: limitation is eliminated on the consumption of electricity at the stand of train, contamination of platform "disappears", by the spilled coal, possibility of adjusting of temperature appears in every compartment (not in all) and etc.

On the other hand power is considered to be necessary for the beginning of movement and acceleration to cruising speed between the stations in a locomotive. However, at movement of composition, the power is required only for overcoming of aerodynamic resistance after-grass and resistances of wheels friction of carriages with rails. It fully assumes that the use of the "prepared" electric power of locomotive for providing the electricity on carriages of composition.



It is known that time of acceleration occupies less than 5 minutes from the beginning of movement. In the 1st picture the change of electric power of locomotive is shown at the beginning and after the acceleration movement. Also, a few variants of correlation of the power between the beginning and acceleration of movement and the electric power on the route (0.5, 0.6, and 0.7) are carried out on that picture.

The other case of enhanceable power of locomotive is movement of high-rise. The consideration of basic routes of passenger-trains is allowed to educate that in Kazakhstan there are a few high-rises which extent the level of a 10 kilometre or at speed 60 kilometres, and enhanceable power time is 10 minutes. The graphic analysis of movement is showed that in high-rise motions (correlation of movements without high-rise and with 5 degrees), the increase of watts-in did not exceed to 15%. Total time of requirement in enhanceable power of locomotive is little so it gives opportunity to use the more power of locomotive in order to ensure passenger carriages with electricity.



The other case of enhanceable power of locomotive is movement of high-rise. The consideration of basic routes of passenger-trains is allowed to educate that in Kazakhstan there are a few high-rises which extent the level of a 10 kilometre or at speed 60

kilometres, and enhanceable power time is 10 minutes. The graphic analysis of movement is showed that in high-rise motions (correlation of movements without high-rise and with 5 degrees), the increase of watts-in did not exceed to 15%. Total time of requirement in enhanceable power of locomotive is little so it gives opportunity to use the more power of locomotive in order to ensure passenger carriages with electricity.

In the 2nd possible chart can be following: electricity from the transformer of locomotive (to specify from that there are a lot of transformers) is given on the transformers of every carriages, (to know whether present transformers one-port, but with an exit with different tensions) in that electricity will be transformed on the tensions required by the electric equipment of carriage. It is fully possible to suppose that weight of transformers of carriages is less than the weight of the total deleted under carriages power equipment and caldron and weight of power carriage. The presence of sufficient surplus power of locomotive allows to apply the use of electric energy in a carriages. A force time of limitation of consumption of surplus power of locomotive does not create perceptible discomfort for passengers (in connection with thermal inertia of carriage) and it will fix the operational mode of locomotive surplus power.

Eventually, more modern information technology, electronics and embed linear carriages source of energy for operation, uninterrupted ventilation and air conditioning of the car.

References

1. A.R. Miller., K.S. Hess., D.L. Barnes., T.L., System design of a large fuel cell hybrid locomotive, Natural Resources Canada, Journal of Power Sources, USA, (2007), volum 173, pages 935–942
2. Кузмич В.Д., Руднев В.С., Френкель С.Я. Теория локомотивной тяги: Учебник для вузов ж.-д. транспорта /М.: Издательство «Маршрут», 2005.-448с.