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ANALYSIS OF OPERATING PARAMETERS ELECTRIC VEHICLES IN LOW TEMPERATURES

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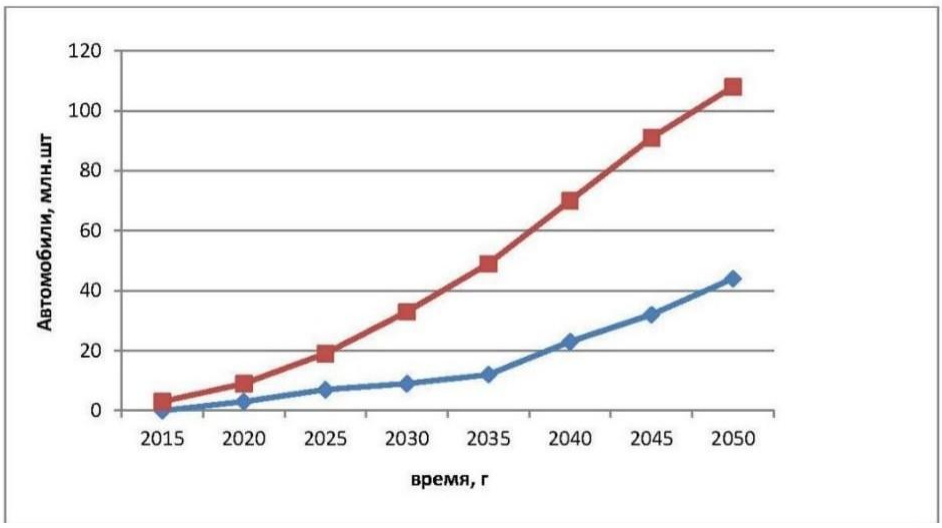
Abstract
Currently, interest in electric vehicles continues to grow in the world, especially in Europe and America. Thus, the production of electric vehicles in the world increased from 240 thousand electric vehicles in 2013 to 400 thousand in 2014. And according to the forecast, sales of electric vehicles by 2024 will grow to 7.2 million electric vehicles. According to the forecast of the International Energy Agency, the electric vehicle market will actively grow, which is well shown in Figure 1.



1 - hybrid cars; 2 - electric cars
Fig.1. Forecast of world sales of cars using electricity

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Rice. 2. Nissan Leaf Electric Car Diagram

Under the hood there is an electric motor with a capacity of 80 kW (approx. 108 hp), whose torque reaches 280 Nm. Electric car drive

— front. Lower location of the heaviest element of the car

— The battery provides better stability compared to its classmates. In addition, the battery also provides higher rigidity for five-door hatchbacks of a similar design. The battery capacity of 24 kWh and regenerative braking capabilities are enough (according to Nissan representatives) for 160 km of mileage. The life cycle of batteries, according to preliminary estimates, should be enough for at least 5 years.

Rice. 3. Electric Motor Power Comparison

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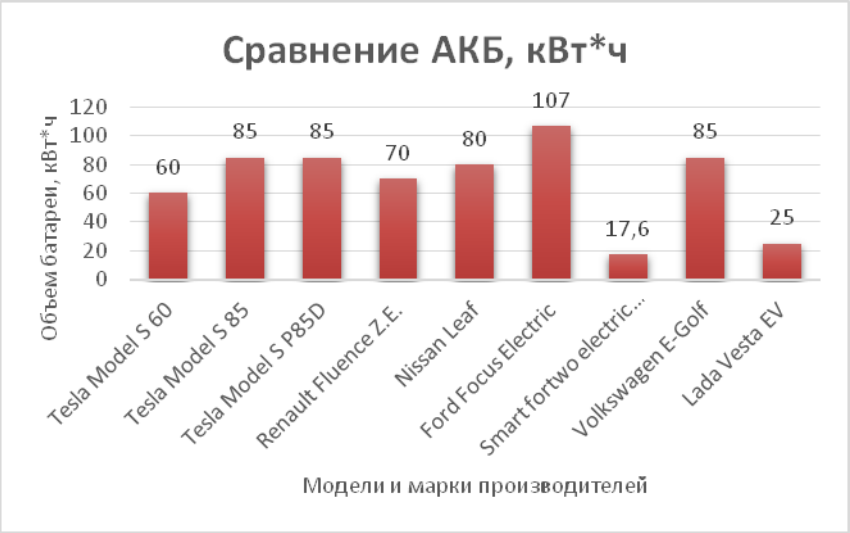
The diagram shows that the Tesla Model S electric car is ahead of other well-known brands of electric vehicles in terms of power.



Rice. 4. Comparison of Electric Vehicle Battery Volume

The diagram shows that the Ford Focus Electric electric car is ahead of its representatives in terms of battery capacity.

Rice. 5. Electric Vehicle Range Comparison

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The diagram shows the range of electric vehicles, of which the Tesla Model S moves forward.

Of the listed units of the car, the important operational components are the electric motor and the battery.

We monitor the types of batteries used in electric vehicles. Using the parameters obtained, a theoretical comparison of battery types was made.

The following types of batteries used in electric vehicles have been identified:

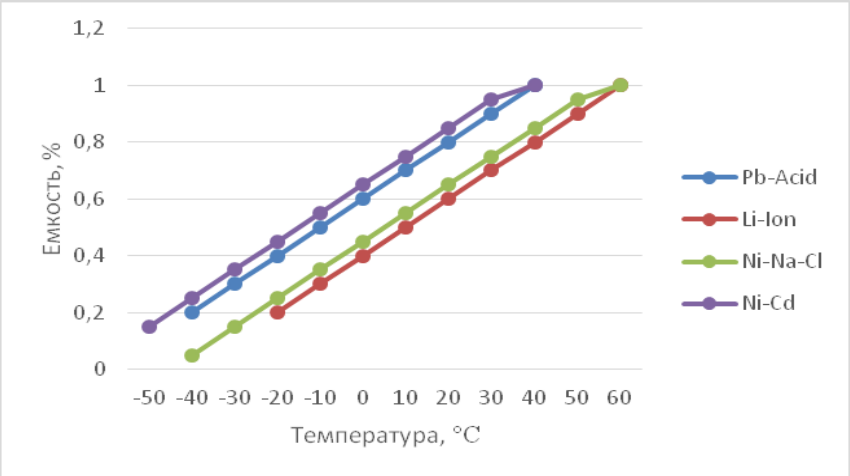
- Lead-acid battery: efficiency – 80-90%, operating temperature can range from -40 to + 40 degrees Celsius, voltage of a discharged battery – 1.8 Volts, EMF of a charged battery – 2.18 Volts, voltage – 2 Volts, energy capacity – 30-60 Wh/kg.
- Lithium-ion battery: the voltage of the charged cell is

4.2 Volta, discharged voltage – 2.75 Volts, temperature regime – -20 to +60 degrees Celsius, charging time - 2-4 hours. Life cycle – over 1000 discharge/battery charge.

- Sodium-nickel-chloride battery: operating temperature - -40 - + 300 degrees Celsius, energy capacity - 730 Wh/kg, EMF - 2.6 Volts. Life cycle - more than 1000 discharge/battery charge.
- Nickel-cadmium battery: Operating temperature from -50 to

+40 degrees Celsius, operating voltage – 1.3 Volts, EMF – 1.37 Volts, power – 150-500 W/kg, energy capacity – 65 Wh/kg.

Taking into account the technical characteristics, we analyzed the operation of the batteries.



Rice. 6. Approximate change in battery capacity from temperature

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Currently, many drivers who want to switch to an electric car wonder how they behave in the cold. As an example, the Nissan Leaf electric car was taken.

Manufacturers say that the mileage will be 135 km on a full charge. But the real mileage depends on several factors:

- Ambient temperature
- Using the stove
- Parking place (on the street or in a warm garage)

The real mileage is from 40-120 km with a full battery charge. The reason is that the stove consumes 3-5 times more power than the air conditioner, we also include a large consumption of headlights, a high rolling resistance in winter.

At -15C, most drivers drive 70-80 km with a full battery charge, and at -25C to -30C, the performance of the "on-board energy" drops, that is, the mileage will be 40-50 km.

- Warming up the cabin takes from 1-2 minutes
- An electric motor is better when it's cold
- There is heated seats and steering wheel
- Handling is much higher, thanks to recuperation.

Overheating of the electric motor by only 10 degrees reduces the service life of insulation materials by half. The next 10 degrees shorten this figure by another half. As a result, when the electric motor overheats by 40 degrees, the service life of the insulation is reduced by 32 times, which makes the life of the equipment so minimal that its use becomes unprofitable. It follows from this that the operation of an electric car in the Far North is possible with proper operation, that is:

- The battery should be kept warm
- Avoid long downtime of an unstarted car in the cold (more than 30 minutes)
- Warming up the car after a long downtime in the cold is desirable when connected to the mains, and not from the battery

Conclusion:

The problem of operating electric vehicles is the battery, that in the future, to solve this problem, an electric car will be tested and ways to keep the battery warm without losing capacity, range and power will be presented.

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With great interest in electric cars, there is a problem of charging a car at electric gas stations.

References:

1. Adashboyevich, M. J., Qoviljanovich, I. S., Abduvali o'g'li, I. H., & Xabibullaevich, X. U. (2021). Modern Technology Of Surface Hardening Applied To Parts Of The Car. NVEO-NATURAL VOLATILES & ESSENTIAL OILS Journal| NVEO, 2673-2676.
2. Shohruh, A., Xusniddin, A., Mirzaakbar, O., & Guzalkhon, A. (2022). INDICATORS THAT CHARACTERIZE THE DRIVER, HIS MENTAL STATE AND BIOLOGICAL CAPABILITIES. Universum: Technical Sciences, (6-6 (99)), 45-47. Razokov A.Ya., Abduganiev Sh.O. (2021). FUEL LEVEL SENSOR. Universe: Technical Sciences, 12 (93), ISSN : 2311-5122 80-82
3. Yakubjonovich, R. A., & Abdivalievich, M. U. (2022, May). DRIVING DESCRIPTORY INDICATORS, MENTAL STATUS AND BIOLOGICAL POSSIBILITIES. In Archive of Conferences (pp. 21-23).
4. Sarvar, I., Abdujalil, P., Temurmalik, A., & Jahongir, K. (2021). OPERATING CONDITIONS OF TRUCKS AND THE SAFETY OF THE TRANSPORT PROCESS. Universum: технические науки, (6-5 (87)), 42-45.
5. Polvonov A. S., Shotmonov D. S., Abdusattarov N. A. U. Theoretical prerequisites for increasing the durability of the main bearing beds depending on the thermal conductivity of the joints //Universum: technical sciences. – 2019. – no. 10-1(67). - S. 23-27. Hicks, D. J.: Autonomous vehicle safety: lessons in the philosophy of science. IEEE Technology and Society journal 37(1), 62-69 (2018).
6. Online resource: the official website of Scania, https://www.scania.com/global/en/home/products-and services/connectedservices/fleet - management.html (Date accessed: 26.07.2019).
7. Makarova I. et al.: Development of an integrated information environment Conference on technology management, operations and solutions, ICTMOD 2018,Pp. 268-273 (2018).