

GIVING ELECTRIC POWER

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ABSTRACT

The article describes the biography of Alexander Alekseev, who greatly contributed to development of railway electric engineering in Russia in the middle of the 20th century. hundred years ago, when work on creation of the first domestic traction motors for rail locomotives

Keywords: electrical engineering, transport, energy, electric motors, Alexander Alekseev, design of electrical machines, history, biography pages.

Background. Electrotechnical scientist, one of the founders of the Russian school of electrical engineering, professor, doctor of technical sciences, corresponding member of the USSR Academy of Sciences, honored railway employee Alexander Yemelyanovich Alekseev was born on November 27 November (15 by old style calendar) 1891 in a peasant family in the village of Sorokino, Kashinsky district, Tver province (now Kimry district of Tver region). After the famine of 1891–1892, the family moved to St. Petersburg.

Objective. The objective of the author is to consider life and scientific achievements of a prominent electrotechnical scientist Alexander Yemelyanovich Alekseev.

Methods. The author uses general scientific methods, historical-retrospective method, scientific description.

Results. Alekseev began his career in 1907 after graduating from a vocational school in mechanical engineering of the Imperial Russian Technical Society. For a considerable time, the young man worked as a turner at the plant «Elektrik». In 1916, through the competition of certificates, he entered the Electromechanical Department of Petrograd Electrotechnical Institute (now St. Petersburg State Electrotechnical University).

During his studies, when he was still a student, under the guidance of professor J. M. Gakkel, he designed and manufactured DC electric traction motors PT-100 for the first Russian locomotive Shch^{EL} with electric transmission, which on November 7, 1924 made a trip on Oktyabrskaya Railway. This diesel locomotive was preserved and installed in 1972 as a historical relic for eternal parking in Moscow at Khovrino station, then removed in 1997 to the railway museum at Warsaw station in St. Petersburg, that in 2017 was transformed into the Museum of railways of Russia. The electrical engineering student also participated in the design of the first traction electric motors for the tram, which became a separate, but again significant, page of his biography.

After graduating from the institute in 1925 with the specialty «electrical engineer», Alexander was appointed as the head of the new construction department, and then the technical director of the Leningrad Electrical Machinery Plant «Electrosila», that is, he became the first chief designer of the subsequently famous giant enterprise. Under his leadership, the first domestic hydrogenerators for Volkhovskaya, Zemo-Avchalskaya, Rionskaya, Svirskaaya, Dneprovskaya HPP, a series of turbogenerators up to 50 MW and other large electric machines, the firstborn of the Soviet power engineering, which ensured the implementation of GOELRO plan (the state electrification program of the country) were developed.

He was fluent in three foreign languages (French, German, English), thanks to which his business trips to electrical engineering firms in the USA, Germany, Sweden, Switzerland, Czechoslovakia, France and other

and trams was just beginning in the country, no one knew the name of this famous man now included in the chronicle of Soviet and Russian science. Thanks to the talent and dedication of such scientists and designers as Alexander Alekseev, the field of energy and electrical engineering has reached great heights in his time.

countries turned out to be very productive. Designed under the direction of the chief designer electrical machines, collector DC converters from the battery to three-phase current with a frequency of 50 Hz, traction motors for diesel locomotives with electric transmission, charging units for radio stations and other electrical equipment for the power industry, metallurgical industry, the navy were in any way not inferior to foreign counterparts.

From 1932 to 1975, Alekseev worked at Leningrad Institute of Railway Engineers (LIIZhT, now St. Petersburg State Transport University), while remaining a consultant for design of large electric generators and engines at «Elektrosila» factories, Novocherkassk and Tbilisi electric locomotive building plant. In 1936, he was elected professor and head of the department of «Electric Machines», which he headed until the end of his days, nearly for forty years [8]. In 1938, without defending a thesis and considering the totality of completed scientific work, he was awarded the degree of D.Sc. (Eng). In the pre-second world war years, he completed the creation of a traction electric motor for a prospective voltage of a contact network of 6 kV DC, as well as the manuscript of the book «Traction motors». In 1938–1939, he published for students the textbooks «Traction electric machines» [9] and «Turbogenerators» [10].

From 1943 to 1953, Alexander Emelyanovich was the dean of the energy faculty of LIIZhT. During the Great Patriotic war (1941–1945), he led the design of the automatic rail welding machine RKSM-200-201, the serial production of which began in 1945. For development of the rail welding machine, which was of great importance for restoration of railways destroyed during the war, Alekseev in 1949 was awarded the State Prize. For the monograph «The design of electric machines» [11], published at the same time, in 1951 he was again awarded the State Prize. The book was reprinted several times in the USSR and was translated into foreign languages.

In the post-war years, Alekseev worked in the field of electrification of railways, substantiated the idea of a new type of high-speed rail transport with linear asynchronous electric motors, and put forward the idea of using magnetic suspension for trains in the metro. In comparison with asynchronous DC motors, there were drawbacks: comparatively low reliability of the collector unit and the brush unit, limited power in the allotted dimensions according to the switching conditions and mechanical strength, high maintenance and repair costs, increased mass at relatively low torque values, relatively low implementation of the coupling weight of the locomotive and its traction properties. The advantages of the asynchronous version have been convincingly demonstrated in many designs. For high reliability and good technical and economic performance of traction motors NB-418K, VL80^r and VL80^g electric locomotives were awarded the State Quality Mark. Under the guidance of



Alexander Alekseev at the department of Electric machines in Leningrad institute of railway engineers (now St. Petersburg Transport University).

professor Alekseev, the first prototype locomotives with asynchronous electric motors with frequency control rotational speed were created in the USSR. According to the test results, the industry produced an experimental electric locomotive VL80A-751 with a capacity of 9600 kW and an experimental diesel locomotive TE-120-001 with a capacity of 4000 hp (2944 kW). And this is only a part of what he did for the theory and practice of engine building and improvement of the design of electric locomotives and diesel locomotives [15].

In 1953, A. E. Alekseev was elected a corresponding member of the USSR Academy of Sciences in the field of technical sciences (electrical engineering) and at the same time worked at the Institute of Electromechanics of the Academy of Sciences. In 1957, he was awarded the honorary title of Honored Scientist and Technician of the RSFSR.

The academic image, the professorial staidness, which inevitably appear in the meager lines of his biography, should not deceive anyone. Alexander Emelyanovich was extremely sociable, lively and enthusiastic person. In 1920–1930s he began to engage in mountaineering. He was not ashamed, together with the students, to defend the sporting honor of the faculty in various competitions, often won swims in the pools from his much younger rivals.

Especially attracted by his hiking in the mountains, he was a candidate for the master of sports in mountaineering. Together with his colleagues and friends, he conquered many passes of the Main Caucasus Range, climbed the peaks of Gvandra, Wii-Tau, Dzhanutagan, and when he was already over 70 years old, he climbed Ullu-Kara (4302 m).

Conclusion.

Alexander Yemelyanovich Alekseev died on May 16, 1975 at the age of 83 years. His main scientific works were devoted to the theory, design of electrical machines, the methods of their mechanical and (after the appearance of the theory of ventilation) thermal calculations.

For fruitful work in the field of the theory of electric cars, contribution to the method of their design, mechanical and ventilation calculations, achievements in the field of electric traction on direct and alternating current, he was awarded orders and medals. The name of a great scientist, engineer and researcher, honorary railway worker A. E. Alekseev was assigned to the electric traction laboratory at St. Petersburg State Transport University.



Pilot electric locomotive VL-80A-751.

Our colleague was buried in the village of Komarovo (Leningrad region).

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