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Liudmyla Vaniuha

Ternopil Volodymyr Hnatiuk National Pedagogical University
2, Maxyma Kryvonosa Street, Ternopil, Ukraine, 46027
E-mail: Ludmyla_vanyuha@ukr.net
<https://orcid.org/0000-0003-0851-0067>

Iryna Zharkova

Ternopil Volodymyr Hnatiuk National Pedagogical University
2, Maxyma Kryvonosa Street, Ternopil, Ukraine, 46027
E-mail: irynazharkova@gmail.com
<https://orcid.org/0000-0003-0217-1498>

Mariya Markovych

Ternopil Volodymyr Hnatiuk National Pedagogical University
2, Maxyma Kryvonosa Street, Ternopil, Ukraine, 46027
E-mail: marijater@gmail.com
<https://orcid.org/0000-0002-0510-2001>

Stepan Pryidun

Ternopil Volodymyr Hnatiuk National Pedagogical University
2, Maxyma Kryvonosa Street, Ternopil, Ukraine, 46027
E-mail: pryidun@tnpu.edu.ua
<https://orcid.org/0000-0003-1047-312X>

Yuriy Drevnitskyi

Ternopil Volodymyr Hnatiuk National Pedagogical University
2, Maxyma Kryvonosa Street, Ternopil, Ukraine, 46027
E-mail: DrevnY@tnpu.edu.ua
<https://orcid.org/0000-0001-9257-4535>

Analysis of prerequisites and conditions for the foundation of an aircraft engine enterprise in Ukraine

***Abstract.** World War I proved air forces to be a critical driver for warfare outcomes. Mastery of the latest technology appeared to be crucial to the battle's success. The combat capabilities of airplanes improved manifold due to the increased power of aircraft engines, thus initiating a new era in aeronautics. By July 1917, the*



aviation of the Russian Empire included 91 air squadrons and 5 units of heavy multi-engine aircraft known as Ilya Muromets. Several enterprises, including the town of Aleksandrovsk, were manufacturing engines for these planes. The origin of engine production in Aleksandrovsk was associated with the establishment of a branch of Petrograd Joint Stock Company of Electromechanical Structures called Deka. The article aims at analyzing the prerequisites and conditions for the foundation of an aircraft engine enterprise in Ukraine. While drafting the article, the authors relied on chronological, historiographical, and other historical methods of research, which have been widely used both in considering the contribution and influence of certain individuals and reviewing the stages of creation and development of separate enterprises, as well as specific industries. Based on the retrospective analysis, the prerequisites and conditions of the foundation of the aircraft engine enterprise in Aleksandrovsk, Ukraine, were considered. There was a severe gap between the Russian Empire and European countries in the development pace of the aviation industry during World War I. This prompted the Russian Empire to raise foreign capital, as well as attract technologies and specialists to develop aircraft engineering and other industries. By 1917, the plant had gained the status of Russia's largest engine-building enterprise in terms of building area and one of the best in equipment. It is evident that the beginning of aircraft engine production in Aleksandrovsk relates to the establishment of a branch of Petrograd Joint Stock Company of Electromechanical Structures and the plant's purchase from the Moznaim brothers.

Keywords: Russian Empire; history of technology; aircraft engineering; Ilya Muromets aircraft; first aircraft engine; bomber

Introduction.

Aircraft engine production in the city of Zaporizhzhia (Ukraine) has already been existing for over 100 years. This legendary history started with making an engine for the famous aircraft, the world's first mass-produced multi-engine bomber named after Ilya Muromets (see Fig. 1), the Russian hero of epic poetry. This aircraft, which gained wide fame during World War I, became a symbol of the emergence of the aviation and aircraft industry in the Russian Empire (Kemaloğlu, 2014; Vasilev, K. K. & Vasilev, Yu. K., 2017; Bogdanov, 2021; Vasigh & Azadian 2022). Zaporizhzhia engine-building plant runs along with this industry from its starting point. Its activity influenced not only the industry of the Russian Empire but also the world aviation industry.

The article aims at analyzing the prerequisites and conditions for the foundation of an aircraft engine enterprise in Ukraine.

Research methodology.

While drafting the article, the authors relied on chronological, historiographical, and other historical methods of research (Li, Kuhn, Bar-Yosef, Chen, Peng, & Gao, 2019; Li, Kuhn, Bar-Yosef, Chen, Peng, & Gao, 2019; Michel & Smadja, 2021;

Sulistyo, Khakim, Jauhari, & Anggraeni, 2021; Lenc, Martínek, Král, Nicolao, & Christlein, 2021), which have been widely used both in considering the contribution and influence of certain individuals (Baig, Al-Ma'adeed, Bouridane, & Cheriet, 2018; Pylypchuk & Strelko, 2020; Strelko & Pylypchuk, 2021) and reviewing the stages of creation and development of separate enterprises, as well as specific industries (Lee, Lee, Kim, & Shin, 2018; Sizov, 2019; Lamberg, Lubinaitė, Ojala, & Tikkanen, 2021; Manioudis & Milonakis, 2021; Wang, Chang, Xu, Wang, & Kadiramanathan, 2021).

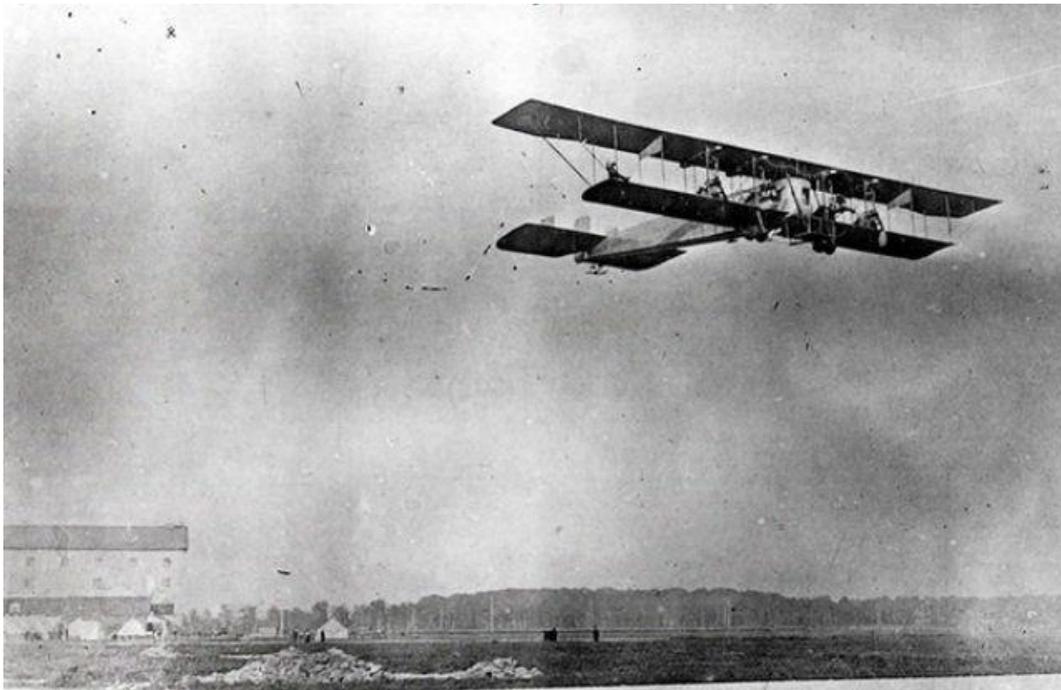


Figure 1. The largest pre-WW1 plane – S-22 Ilya Muromets (Lazko, 2020).

Results and discussion.

The Russian Empire's failure to develop aircraft engine production was a weak spot for the emerging aviation industry, so the Main Military-Technical Administration and the Air Fleet Directorate had to perforce rely on foreign manufacturers of aircraft engines. Shortly before World War I, the Military Ministry acquired licenses to build Gnome rotary engines in the Russian Empire from components manufactured in France. The engines were assembled at the plant of the Society of Gnome & Rhône Engines, founded in Moscow in 1912 (Popov, 2019). It's worth noting that French people prevailed among the employees of these Moscow assembly workshops.

The Russo-Baltic Wagon Factory in Riga, which in addition to railway cars also constructed vehicles, started mastering aviation production several years before the outbreak of the First World War.

In 1911, the board of the Russo-Baltic Wagon Factory invited Igor Ivanovich Sikorsky, a young designer, who became the head of the aviation department of the St. Petersburg plant. Such aviation designers as K. K. Ergant, M. F. Klimikseev, A. A. Serebrennikov, A. S. Kudashev, G. P. Adler worked in the department of

I. I. Sikorsky. The same year, the Russo-Baltic Wagon Factory designed and built the four-engine aircraft known as Russian Vityaz, which was tested on May 13, 1913 (Zhurilo, Gutnyk, & Zhurilo, 2022). The next multi-motor aircraft, built at the Russo-Baltic Wagon Factory, was the Ilya Muromets aircraft. The upper wingspan made up 34.5 m, with a bearing surface area of 182 m² and a distance between upper and lower wings of 2.5 m (Beggs & Sikorsky, 2014). Ilya Muromets featured a pilot's cabin, a living room, a bedroom, and a toilet. Basically, it was a complete airborne house. The plane had electric lighting. It weighed 3,500 kilograms unloaded. When designing Ilya Muromets, a solid fuselage was used for the first time, enclosing the cabin in a single streamlined body. The main materials were pine, plywood, and canvas fastened with metal parts. The designers of Ilya Muromets supposed not only military but also purely civil use of the machine, so G. V. Alekhovich, test pilot, proposed sending the Ilya Muromets aircraft with an expedition to the North Pole.

Ilya Muromets's first flight failed. After climbing to less than eighty meters, the aircraft suddenly lost speed, collapsed on the left wing, and fell to the ground. Fortunately, the pilot sustained only minor injuries. The accident was caused by the installation of an additional wing, which disrupted the proper alignment of the aircraft. The aircraft was repaired within five days, the wing was removed, and Ilya Muromets successfully passed flight tests. In February 1914, the aircraft set a record, lasting five hours in the air with sixteen passengers on board (Fortier, 1996, p. 4).

This masterpiece of the aviation industry of the Russian Empire was demonstrated at Tsarskoye Selo to Emperor Nicholas II (Jones, 2013). On December 10 (23), 1914, the Emperor approved the decision of the Military Council to create a squadron of Ilya Muromets bombers, headed by M. V. Shidlovsky. Today, he is considered to be the founder of the strategic aviation of the Russian Empire.

World War I proved air forces to be a critical driver for warfare outcomes (Schwonek, 2014; Karataev, Adinyaev, Artemova, & Volkov, 2019; Degtyarev, Gerasymov, Gut, & Polyakova, 2021; Rance & Snape, 2021). Mastery of the latest technology appeared to be crucial to the battle's success. The combat capabilities of airplanes improved manifold due to the increased power of aircraft engines, thus initiating a new era in aeronautics of the Russian Empire.

Before World War I, the Russian Empire was already training aircrew at several specialized aviation schools. However, there were not enough graduates to meet the staff shortage in the booming aviation industry. Some Russian pilots were trained abroad, particularly in England and France, where they mastered a course that included flights with an instructor, independent flights, motor training, aerobatics, and bombing. By July 1917, the aviation of the Russian Empire included 91 air squadrons and 5 units of heavy multi-engine Ilya Muromets aircraft (Shunkov, 2022, p. 57). Naval aviation consisted of 32 air detachments. By June 1, 1917, there were 645 pilots in the front detachments of the Russian Empire, 53 pilots in the rear detachments, 26 pilots in the divisions, and 15 members in the air-front departments and air groups. About half of all aircrew died in the air battles of World War I.

There was a severe gap between the Russian Empire and European countries in the development pace of the aviation industry during World War I. Over the war period, the Russian Empire built 5012 aircraft, while England produced 55,000 pieces, France – 51,100, and Germany – 46,000 (Sinikov, 2014). The Russian Empire built 1,511 engines, England – 41,000, France – 93,000, and Germany – 40,200.

Ilya Muromets was equipped with seven machine guns to assist in combat operations (Chaney & Greenwood, 2019). This aircraft proved to be a perfect frontline machine, performing over 400 combat sorties and dropping almost 65 tons of bombs (Sikorsky, 2007, p. 10). For the first time in the world practice, the bombs weighing 25 pounds were designed specifically for the Ilya Muromets aircraft. The Russian plane was the sole one in the world, capable of carrying such bombs. Named after the Russian epic hero, the aircraft inflicted heavy damage on the enemy. For example, on June 14, 1915, Bashko, a pilot of the Ilya Muromets bomber, dropped some bombs at Prazharovsk station, destroying an enemy train full of shells (Jones, 2019). Three German Brandenburgs attacked the Russian aircraft. Despite being wounded and having its fuel tanks breached, Bashko managed to fly over the frontline on this aircraft.

In the summer of 1915, the Russo-Baltic Wagon Factory launched mass production of the RBZ-6 engine with 150 HP capacity based on the German single-row six-cylinder engine called Argus, and by 1915, this engine began to be installed on the Ilya Muromets aircraft (Shavrov, 1974, p. 49). For a while, this used to be the main engine for this type of plane. After the aircraft was adopted by the army of the Russian Empire, more powerful 220 HP Renault engines, which were produced in Petrograd at the Russian Renault plant (later this enterprise was renamed Red October, Klimov Plant, now it is known as JSC UEC-Klimov), were installed to improve its flight and technical performance (Sikorsky, 2007, p. 10). Petrograd plant capacity was up to ten engines per month and, except for Ilya Muromets, 220 HP engines produced by Russian Renault were supplied to several types of experimental aircraft of the Russian Empire (Kulikov, 2001).

German and Austrian planes and, among others, two-seat Albatros reconnaissance aircraft with Mercedes engines of 100 HP were taken as “trophies” by Russian troops during World War I. Then, copies of these engines were manufactured in the Russian Empire. In the second half of 1916, the production of Mercedes engines was established in the Russian Empire (Kulikov, 2001).

In September 9, 1915, the Technical Department of the Main Military-Technical Administration signed a contract No. 23500 with the Duflon, Konstantinovich & Co. in St. Petersburg to manufacture one 25 Mercedes engines rated at 100–105 HP, and one hundred Benz-type rated at 150 HP (Boguslaev, 2011, p. 51). Engineer B. N. Vorobyev headed the group to develop detailed drawings of the M-100 Mercedes engine. Vladimir Yakovlevich Klimov, the future Chief Designer, whose name is borne by the famous St. Petersburg aircraft engine enterprise, did an internship at the Deka plant in Aleksandrovsk during his studies at the Imperial Higher Technical College at

the recommendation of N. R. Brillings, one of the pillars of the Russian aircraft engine building, where took part in developing the M-100 engine.

The aircraft engine enterprise in Aleksandrovsk was founded at the junction of the eras of two plants (the agricultural machinery plant of the Moznaim brothers and the St. Petersburg electromechanical enterprise Deka), which, although having completely different specifics, were located side by side in Taras Shevchenko Square, which prompted their merger (SAZR, Fund 24, Inventory 1, Case 956, Sheet 16).

The emergence of engine production in Aleksandrovsk was associated with the establishment of a branch of Petrograd Joint Stock Company of Electromechanical Structures called Deka. By the outbreak of World War I, the St. Petersburg enterprise founded by L.-E. Duflon was pretty famous among the business circles of the Russian Empire (Nemkov, 2009; Sashnikova, 2016, p. 38; Pestrikov, Yermolov, & Slyozkin, 2021; Erdogan, 2021, p. 398).

A Swiss citizen of French ancestry, Louis-Edouard Duflon graduated from the Faculty of Physics and Mathematics of the Zurich Polytechnic Institute and then worked at the Breguet Electromechanical Plant in Paris (Boguslaev, 2011, p. 49–50). In the early 1890s, the ambitious Frenchman arrived in St. Petersburg, where he got a job as an electrical engineer at the electrical plant of Prince Tenishev & Co. However, being rather daring, Louis-Edouard Duflon came to the Russian Empire with other goals than to remain a hired worker. First, he managed to become a representative of two Parisian companies, Sotter, Harlez & Co., a manufacturer of electric machines, and E. Gabriel & H. Angenolt, a manufacturer of incandescent lamps. Duflon's career in the Russian Empire was made possible by the approximation between the Russian Empire and the French Republic. The share of the French capital in the economy of the Russian Empire increased sharply, and during 1869–1887, 17 foreign enterprises emerged in the Russian Empire, 9 of which were French.

In 1892, Duflon founded an electrical workshop in St. Petersburg, employing 15 people (Alekseev, 2012). The workshop was engaged in the installation of electrical equipment. Later, Duflon found a companion, Apollon Vasilievich Konstantinovich, an owner of a small technical bureau in Moscow on Maroseyka Street. Konstantinovich, as much as Duflon, represented the French firm Sotter, Harlez & Co. As a result of their partnership, Duflon & Konstantinovich (Deka) emerged. It was a Moscow-Petersburg enterprise, but very soon A. V. Konstantinovich, who was doing much better than the St. Petersburg branch, began to play first fiddle in their duet. Basically, Konstantinovich was the main reason why the Deka enterprise acquired such respectable clients as the Aleksandrovsk Mechanical Plant in the capital, the Goujon plant in Moscow, and the Nikolayevska Railway Company. Still, even those clients were not enough to boost the enterprise of Duflon and Konstantinovich. The companions were supported by Sotter, Harlez & Co. At their recommendations, Duflon and Konstantinovich received government orders from the Military and Naval ministries of the Russian Empire for the supply and installation of electromechanical equipment for the ships of the Russian fleet.

On December 20, 1895, Duflon and Konstantinovich bought a land plot on Lopukhinskaya Street in St. Petersburg (now Academician Pavlov Street), where they began building the plant. The plant's buildings (a forge, a mechanical workshop, a room for a steam engine) were built quite promptly, and on December 14, 1896, the enterprise commenced operations. In 1897, Deka got an order to supply and install electrical equipment for the naval artillery. Deka specialists and workers installed electrical equipment on the ships of the Baltic and Black Sea Fleets, and the Port Arthur Squadron. In particular, they worked on the coastal defense battleship General-Admiral Apraksin, the squadron battleships Peresvet, Oslyabya, Petropavlovsk, Prince Suvorov, etc. These ships were involved in the tragic Battle of Tsushima. Besides orders from the defense ministries, Deka fulfilled contracts for lighting in the imperial theaters. As the workload increased, the number of plant staff reached three hundred employees.

It is worth mentioning that in this pre-war period, Deka already contributed to aeronautics in the Russian Empire. In 1910, an aeronautics department was opened at the plant.

In 1912, the airship called Kobchik (2,150 cubic meters shell volume, 45 m length, 8 m diameter, and 50 km/h maximum speed), designed by S. N. Nemchenko and A. E. Garuta, was developed and successfully tested at Deka (Lashkov & Golotyuk, 2015).

At the beginning of World War I, when the Russian Empire was rushing to catch up with the Western countries in aircraft production, the Deka enterprise started working hard on aircraft engine construction. Although Deka had a large and well-equipped production base with enterprises in Petrograd, Moscow, Kharkiv, and Yekaterinburg, all its departments were already loaded with military production. Extra production facilities were needed to fulfill the new contract. It was originally planned to open a branch in the city of Sevastopol to build, and the negotiations had already begun to buy land and factory buildings (Boguslayev, 2011, p. 52). However, there was an objection from the Engineering Department. Then the Deka board turned to the factory of Hatskel and Rafael Moznaim in Aleksandrovsk (now the city of Zaporizhzhia in Ukraine). Yet there were difficulties as well. To overcome them, they had to contact the August Chief Petty Officer of the Air Fleet, the Grand Duke Alexander Mikhailovich Romanov. After Grand Duke Alexander Romanov stepped in, the acquisition of the Aleksandrovsk plant proceeded apace.

On November 23, 1915, the Duflon, Konstantinovich & Co. applied to the City Council of Aleksandrovsk with the request to allocate a land plot on Shevchenko Square next to the agricultural machinery plant of the Moznaim brothers (Kozlova, 2010, p. 33).

It was about creating a branch of the capital's enterprise in the city of Aleksandrovsk. Negotiations with the City Council were conducted by the managing director of the joint-stock company, Pyotr Pavlovich Azbelev (Boguslaev, 2011, p. 49), retired Navy Major General, who informed that the enterprise intended to establish the production of internal combustion engines and, in particular, aircraft engines in

Aleksandrovsk, promptly employing about a thousand employees from the local people. In addition, when the war would be over, the enterprise intended to focus on electromechanical production, namely, the production of electric engines, dynamos, and electric drives for mine and mill devices. This issue was considered at the meeting of the City Council on November 25, 1915. The City Council ruled to sell the land plot on Shevchenko Square next to the plant of the Moznaim brothers with a total area of 5.469 hectares, setting a price of 4 rubles per square fathom. Then the Council allowed the enterprise to run a railroad track to the plant. The rent for using the land under the railroad track was set at 30 kopecks per square fathom.

On December 24, 1915, P. P. Azbelev, the managing director, informed the Aleksandrovsk City Council that the Joint Stock Company of Electromechanical Structures had purchased the plant of the Moznaim brothers along with the manor. Therefore, Deka displaced its unfortunate neighbor and finally acquired their fading production (Boguslaev, 2011, p. 52). Its owners failed to secure military orders and the demand for civilian products was steadily decreasing. Things were getting worse for the Moznaim brothers, so the Deka board managed to agree with them, and soon the plant changed its owner (SAZR, Fund 24, Inventory 1, Case 2014, Sheet 20). Having decided to avoid litigation, the administrator on the Moznaim brother's case sold the land plot on Shevchenko Square of 3,648 square fathoms to the Joint-Stock Company of Electromechanical Structures on February 16, 1916, "with all the buildings, facilities, and agricultural equipment not yielding any income, as well as machinery and tools, which were not operating..." for 300 thousand rubles (SAZR, Fund 24, Inventory 1, Case 956, Sheet 16).

In December 1915, the bill of sale was signed, and in April 1916, new production buildings were built and equipped with modern machinery purchased in America and delivered via Arkhangelsk and Vladivostok at a total cost of 500 thousand rubles (Boguslaev, 2011, p. 52). Then other workshops were built, as well as facilities specializing in the future business activity of the enterprise. The main new building was the 419 m² test station, a large spacious building with a stand, the necessary utilities, electric lighting, and ventilation. After the plant expansion, it became the largest engine-building enterprise in Russia in terms of building area and one of the best in equipment. The factory had the following technical equipment: a single-cylinder steam engine of 22 HP, a Cornish steam boiler with a heating surface of 40 m², a Sulzer steam engine of 350 HP, and two steam boilers with a heating surface of 90 m² each. Moreover, there were 86 units of metal and woodworking machines in the Deka plant (Fig. 2). The annual income of the enterprise totaled 150 thousand rubles.

Construction and installation works were usually carried out in-house by specialized hired labor crews. As of May 1, 1916, there were 263 workers at the Deka plant, and more than half (146 men and 30 women) of them were employed in construction (Ivanov, 2010). Prisoners of war (Croats, Slovaks, Czechs, Poles, Romanians, and Germans) were involved in the construction work. As of October 1917, there were 70 of them. The construction of the two-story brick building of the

steel foundry (total area of 1,344 m²) with metal truss roofing and lantern glazing along the whole length of the building, as well as premises for casting molds and blowers was started at the Deka plant. In 1915–1916, 4,520 m² of premises were built at the plant in addition to the production areas of the former Mozaim brothers plant.

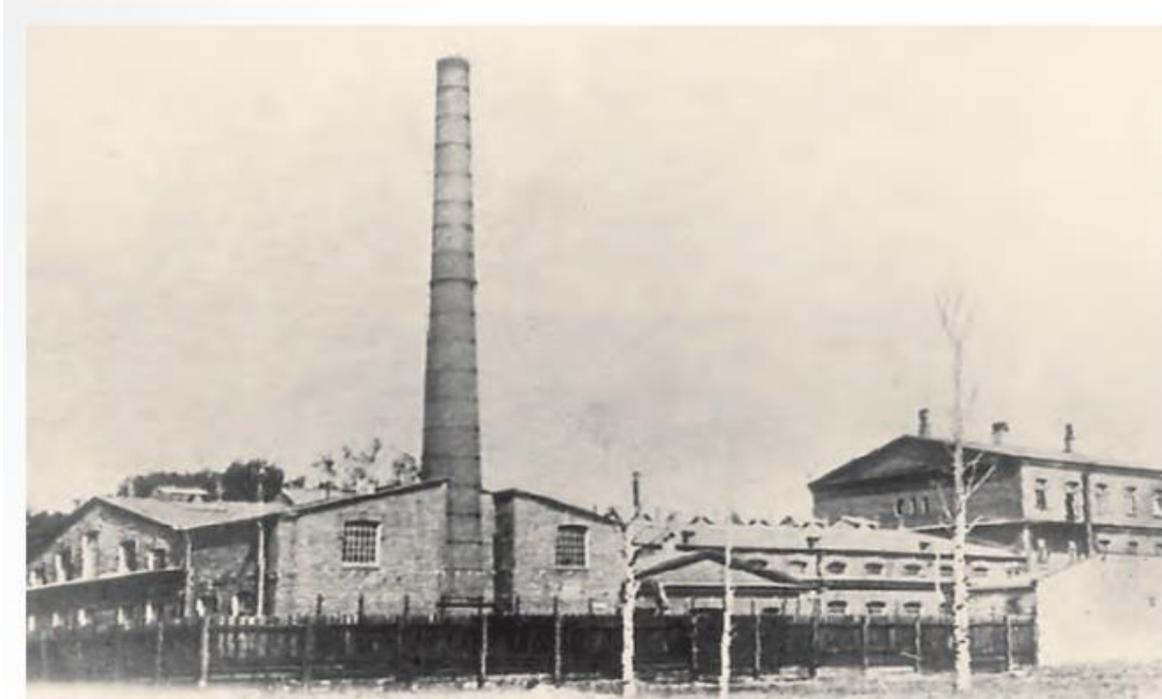


Figure 2. The Deka plant in 1916 ((Boguslaev, 2011, p. 52).

The first five single-row six-cylinder Deka M-100 engines with spare parts and one extra set had to be delivered by the end of August 1916 (see Fig. 3). It turned out to be extremely challenging. The German design “did not fit” neither with the technology and the system of limits and fits adopted in the Russian Empire nor with the capabilities of Russian and American machines. They had to figure out the materials used by the German designers and select a local replacement, bearing in mind the need for strength, heat and wear resistance, as well as friction properties. The work on the “adaptation” of the Mercedes engine to our production was led by engineer Vorobyev, and the development of the more powerful Benz was handled by engineer Kireev (Boguslaev, 2011, p. 57).

In August 1916, the first vertical single-row six-cylinder 100 HP water-cooled Mercedes engine named Deka M-100 was produced at the Deka plant in Aleksandrovsk and submitted for testing (Fig. 4). Major General Pnevsky reported to St. Petersburg: “...the first 100 HP engine, made entirely of Russian materials, was put into operation and yielded quite satisfactory results” (Boguslayev, 2011, p. 53). The plant proceeded to execute the contract in full. Soon the managing director of the company, P. P. Azbelev signed contract No. 23500 of September 9, 1915, with the Technical Department of the Main Military-Technical Administration to supply aircraft engines.

According to the contract, the Deka plant was committed to supplying the army with 25 aircraft engines of the Mercedes 100–105 HP type and another 100 aircraft engines of Benz 150 HP type. The contract amounted to 2 million 473 thousand rubles (Boguslaev, 2011, p. 51).

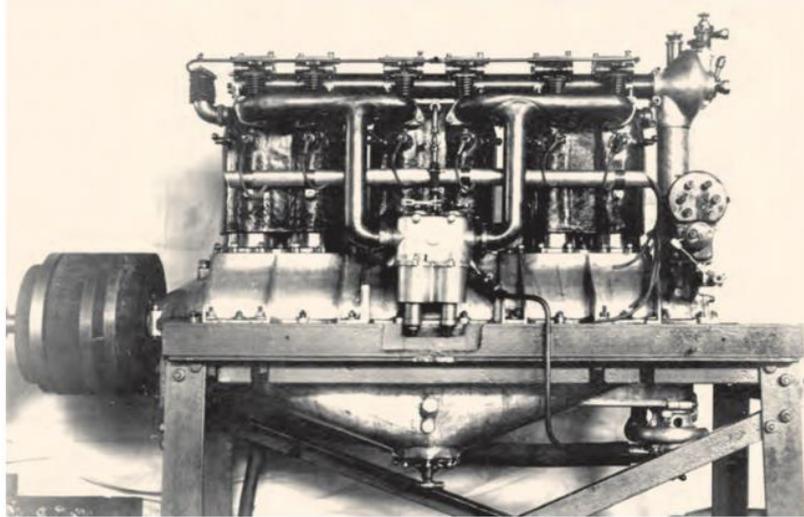


Figure 3. The Deka M-100 engine (Boguslaev, 2011, p. 51).

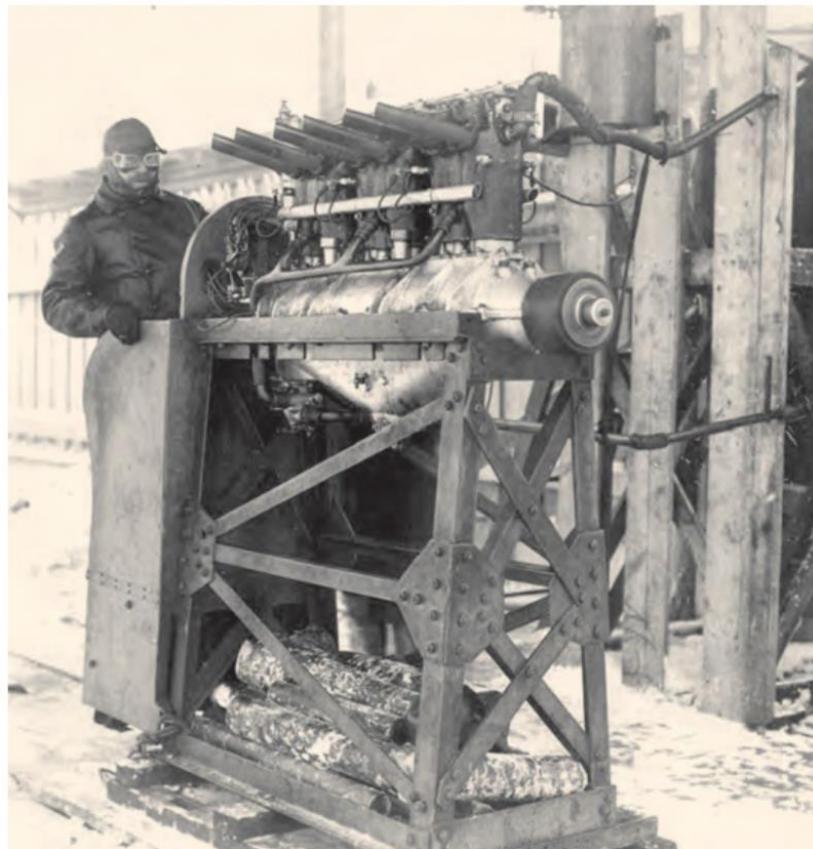


Figure 4. 6-hour testing of the DEKA M-100 engine. Controls the operation of the engine B. N. Vorobyov. Aleksandrovsk, 1916 (Boguslaev, 2011, p. 51).

Having developed the detailed drawings of 100 and 129 HP engines, B. N. Vorobyev proceeded to the development of the technical project of a 160 HP aircraft engine, which was completed in August 1916. In October, the project was approved by the Technical Committee of the Military Air Fleet Department and recommended for implementation. The Technical Committee advised B.N. Vorobyev to increase the engine capacity and modify its design so that parts of the 175 HP Mercedes aircraft engine could be used. Upon refinement of the project, the design of the new M-168 engine rated at 168 HP was obtained. Then the Military Air Fleet Department and the Joint Stock Company of Electromechanical Structures signed Amendments No. 35835 and No. 35836 dated April 5, 1917, which, instead of producing and supplying 180 units of M-129 engines, provided for producing and supplying 180 units of M-168 engines (Boguslaev, 2011, p. 55). They started manufacturing parts for this engine. In 1917, the Deka plant in Aleksandrovsk, in addition to the Mercedes engines rated at 129 HP, mastered the production of the same type of engine rated at 170 HP.

Apart from the production of aircraft engines, the Deka plant also took other orders from the Military Department. For example, on November 25, 1916, the plant received order No. 39814/17202 for the manufacture of 400,000 projectiles intended for throwing from airplanes, for 19 kopecks apiece, amounting to 76,000 rubles (Boguslaev, 2011, p. 56).

By the end of World War I, the administrative building with an area of 721,2 m², a brick two-story mechanical workshop with an area of 1947 m² with the adjacent storehouses, and household premises for tool equipment were constructed at the plant. The plant commissioned an outbuilding to the steel foundry to accommodate non-ferrous castings, a plant garage, and an expanded boiler house with a machine hall.

There were several aircraft-engine plants in the Russian Empire during World War I: Gnome and Rhône plant and Salmson plant in Moscow, the aviation department of the Russo-Baltic Wagon Factory in Petersburg, the Motor plant in Riga, the Russian Renault plant in Rybinsk, the Deka plant in Aleksandrovsk. The year 1917 began with the February Revolution. However, by the outbreak of the Civil War in the Russian Empire (1917–1921), all these enterprises collapsed, engine production was terminated, and it seemed that the Russian Empire would cease to be an aviation power once and forever.

It was these force majeure circumstances that prevented the intensification of aircraft engine building in the Russian Empire. During 1917, the board and staff of the Deka plant in Aleksandrovsk did their best to continue producing engines and to preserve the enterprise from embezzlement, but the enterprise could no longer exist in its former state and was dissolved on December 24, 1917 (Ivanov, 2010). However, the Deka plant was nationalized by the Decree of the Council of People's Commissars of January 20, 1918, just less than a month later. Under such circumstances, it could not operate and went out of business for a long time. Thus the Vorobyev and Kireev engines never had a significant impact on the development of aviation in the Russian

Empire, but they were the starting point of aircraft engine production in the Zaporizhzhia region.

Conclusions.

Based on the retrospective analysis, the prerequisites and conditions of the foundation of the aircraft engine enterprise in Aleksandrovsk (Zaporizhzhia), Ukraine, were considered. There was a severe gap between the Russian Empire and European countries in the development pace of the aviation industry during World War I. This prompted the Russian Empire to raise foreign capital, as well as attract technologies and specialists to develop aircraft engineering and other industries. It is evident that the beginning of aircraft engine production in Aleksandrovsk relates to the establishment of a branch of Petrograd Joint Stock Company of Electromechanical Structures and the plant's purchase from the Moznaim brothers.

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Conflicts of interest.

The authors declare no conflict of interest.

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Людмила Ванюга

Тернопільський національний педагогічний університет імені Володимира Гнатюка, Україна

Ірина Жаркова

Тернопільський національний педагогічний університет імені Володимира Гнатюка, Україна

Марія Маркович

Тернопільський національний педагогічний університет імені Володимира Гнатюка, Україна

Степан Прийдун

Тернопільський національний педагогічний університет імені Володимира Гнатюка, Україна

Юрій Древніцький

Тернопільський національний педагогічний університет імені Володимира Гнатюка, Україна

Аналіз передумов та умов створення в Україні авіаmotorного підприємства

Анотація. Перша світова війна показала, що авіація стала серйозним чинником успіху у бойових діях. Для успішного ведення війни тепер особливо

необхідним стало володіння новітньою технікою. Бойові можливості літаків багаторазово покращали через підвищення потужності авіаційних моторів, завдяки чому починалася нова ера в повітроплаванні. У липні 1917 року в авіації Російської імперії налічувався 91 авіазагін та 5 загонів важких багатомоторних літаків “Ілля Муромець”. Двигуни для цих літаків виробляли кілька підприємств, у тому числі в місті Олександрівськ. Початок моторного виробництва в Олександрівську пов'язаний із створенням тут філії Петроградського акціонерного товариства електромеханічних споруд “ДЕКА”. Метою статті є аналіз передумов та умов створення в Україні авіамоторного підприємства. При підготовці матеріалів статті, автори використовували хронологічний, історіографічний, та інші історичні методи досліджень, які знайшли широке застосування, як при розгляді внеску та впливу як окремих особистостей, так і огляду етапів створення та розвитку як окремих підприємств, так і окремих галузей промисловості. На основі ретроспективного аналізу розглянуто передумови та умови створення в Україні авіамоторного підприємства в Олександрівську. У роки Першої світової війни мало місце серйозне відставання Російської імперії від європейських країн у темпах розвитку авіагалузі. Це стимулювало Російську імперію до залучення іноземного капіталу, технологій та фахівців для розвитку авіабудування та інших галузей промисловості. Завдяки цьому до 1917 завод стає найбільшим моторобудівним підприємством Росії за площею капітальних будівель і одним з кращих по оснащенню. Показано, що початок авіамоторного виробництва в Олександрівську пов'язаний із створенням тут філії Петроградського акціонерного товариства електромеханічних споруд та покупкою заводу у братів Мознаім.

Ключові слова: Російська імперія; історія техніки; авіабудування; літак “Ілля Муромець”; перший авіадвигун; бомбардувальник

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