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THE KHARKOV ELECTROMECHANICAL PLANT CONTRIBUTION TO THE SOVIET MILITARY SUBMARINE FLEET FORMATION IN THE 1920-1941

ABSTRACT

This article treats the subject of the Kharkov Electromechanical Plant contribution to the modern submarine fleet formation by the Soviet Union during 1920-1941 for the first time.

It was established that during this period the enterprise role developed from an auxiliary plant to the USSR leading scientific and production organization in the sphere of submarines power electrical equipment systems development and manufacture.

It was determined that the decisive factor in the KhEMZ growth contribution to the Soviet Navy submarine forces strengthen programs was the development of the factory's structures for the profile products creating processes scientific support.

At the same time, it was revealed that on the whole the enterprise scientific and technical potential in the interwar period was used inefficiently, as a result of which since 1934 none of the programs to create a modern submarine fleet was executed in a timely manner.

Keywords:

soviet navy, submarine, submarine forces, naval electrical engineering, power equipment, scientific and technical potential, scientific support.

Introduction

At the end of World War I, the results of the submarines of all countries that had them, and whose submarines took part in the fighting at

sea, received the highest marks. As a result, in the interwar years, almost all maritime states launched programs to create or significantly expand the submarine fleets of their own naval forces. The Soviet Union was not an exception, beginning in the mid-1920s the first stage of strengthening the capabilities of the submarine forces of its naval forces. However, having inherited from Tsarist Russia significant experience in the relevant shipbuilding, in terms of giving the submarine hulls the necessary nautical capabilities, in the USSR there was practically no experience in building ship electrical engineering. This fact was due to the fact that in the period preceding World War I, ship electric machines and devices of the Russian Navy were predominantly either imported or manufactured at factories of German electrical companies located in Russia: AEG, «Siemens» and «Lamayer» (Annenkov, 2013, p. 4). Of these manufacturers, the most-involved in the pre-war modernization of the Russian Navy was the AEG concern, represented here by the Russian Society of "Universal Electricity Company" (RS UEC). The Russian society "Universal Electricity Company" had the largest electromechanical plant in the Empire in Riga and naval construction bureaus in Helsingfors, Nikolayev (with the Sevastopol office), Revel and St. Petersburg¹. In 1915, the Riga Plant of the Russian Society "Universal Electricity Company" was evacuated to Kharkov, where it continued its work, including for the needs of the submarine fleet of the Russian Navy, but as the Kharkov Electromechanical Plant (KhEMP) UEC.

After the revolutionary events and the civil war, the KhEMP received all-union subordination, and it is rather difficult to admit that the Soviet government during the modernization of the submarine fleet of the USSR ignored the relevant pre-war experience of the plant. However, there is no information on this in historical studies, that is, there is no historiographic material on the issue raised in this publication, which requires appropriate research. Of additional interest is the fact that, both before and during the First World War, the actual scientific and technical support at KhEMP was absent. By the beginning of the war, while still in Riga, the company received the necessary design and technological documentation from Germany, and during the war, thanks to the cooperation agreement concluded between AEG and the General Electric Company and The British Thomson-Houston Company in early 1914, from the last (Suzdalcev, Kucher, Sherbanenko, 1965, p. 79). That is, by examining the degree of participation of KhEMP in the interwar period in the creation of the submarine fleet of the USSR, we can

¹ Archiwum Państwowe Regionu Charkowskiego (APRCh), f. 348, op. 1–17.

identify the dynamics of the scientific support of its scientific and technical potential within selected chronological borders, taking into account the above point of the corresponding starting

Formation of the soviet underwater navy in 1920–1926

As is known, in 1926 technical measures for the formation of the combat-ready composition of the ships of the Soviet submarine military fleet took place only on the basis of twenty-five submarines inherited from tsarist Russia. Those submarines, the operation of which for one reason or another was no longer necessary, were written off and dismantled. Three more submarines of the AG type, a full set of hulls and equipment which were stored at the Nikolayev shipbuilding plant "Naval" – have been completed. All of the good electrical equipment, taken from eleven decommissioned ships, which could be completed with the appropriate equipment of the eleven submarines remaining in the lineup, was relocated to them. That is, during this period, the production of shipboard electrical equipment of submarines was carried out to a minimum, only in cases of lack of adequate replacement by equipment dismantled from decommissioned ships.

Unfortunately, today there are no documents in Ukraine, on the basis of which it would be possible to assess the degree of participation of KhEMP in the above-mentioned measures to modernize the submarine fleet of the USSR. Therefore, we can only assume on the basis of indirect facts that this participation was insignificant. First of all, it should be noted that the volumes of electrical equipment that were to be manufactured on the basis of the adopted concept of modernization measures, as already mentioned, could not be large in principle. In addition, at that time in the Soviet Union there were two plants of the corresponding profile: the smaller one – "Electrosila" in Petrograd and the larger one – "Electrosila No. 1" (as the nationalized KhEMP UKE was called) in Kharkov. At the same time, "Electrosila" in Petrograd was in a more favorable political, scientific and technical respect, which made this plant a favorite in the process of receiving orders related to the modernization of the submarine fleet. The strength of the scientific and technical positions of the Petrograd enterprise was determined by the presence in the city of the Higher Military Electrotechnical School, the Naval Academy, the Electrotechnical and Polytechnic Institutes. In all these institutions, a sufficiently large composition of scientists for a long period carried out active research work in the field of the general theory of electrical

equipment and in the field of applied naval electrical engineering. At Kharkov Institute of Technology (KhTI), under the leadership of P. P. Kopnyaev, work on the study of electric machines at that time was only unfolding, and only exclusively in the plane of their general theory. Because of this, the level of scientific support that could be provided by third-party scientific and technical divisions of the process of modernizing the submarine fleet was incomparably higher at the beginning of the 1920s than in Kharkov. And this is despite the fact that at the “Electrosila” plant itself, unlike “Electrosila No. 1”, the scientific and technical support for the production of electric machines was attended and headed by the chief electrician (future academician) G. I. Graftio.

From a political point of view, firstly, “Electrosila” was in the “cradle of the Russian revolution” – a city with very strong positions of Soviet power, and therefore with maximum public support and enthusiasm for the modernization process of the submarine fleet of the young Soviet republic. Secondly, one of the most influential at the time members of the Soviet government – L. B. Krasin, during the October Revolution of 1917, he headed this enterprise, and the previously mentioned G. I. Graftio was personally acquainted with the leader of the Soviet state V. I. Lenin. In turn, neither the leadership of “Electrosila number 1” could not boast of such a level of government relations, nor Kharkov – the corresponding level of public support for a victorious government. In addition, the Petrograd “Electrosila” is far less than the Kharkov “Electrosila” suffered during the civil war, if only because of the absence of hostilities and the stability of the government in Petrograd, while in Kharkov during this period power changed in an armed manner, at least five times, each of them accompanied by a rampant economic anarchism.

Thus, the objective and subjective prerequisites for the receipt of the plant “Electrosila number 1” large volumes of military orders were not and financial condition of the company during the years 1922-1926 was very unhealthy, as evidenced even by Soviet historiography (Suzdalcev, Kucher, Sherbanenko, 1965, p. 45). It is unlikely that such a situation could have developed at the plant, involved in the implementation of a large-scale state program for the modernization of the submarine fleet. Although, on the other hand, we cannot assert that individual piece products were not manufactured for the satisfaction of this program. But in any case, in the absence of direct documentary evidence, all the above arguments inspire doubts about the active participation of the enterprise under study at this stage of the creation of the Soviet military submarine fleet.

The work of KHEMP in the six-year program of re-equipment of the submarine forces of the soviet military fleet (1927–1932)

The first Soviet program to build new submarines, rather than completing or repairing the ones inherited from the Russian Empire, was adopted in November 1926 as part of a six-year program of naval shipbuilding. According to her, since 1927 until 1932 in the USSR large torpedo submarines were to be built, as well as minelayer submarines. Building new ships, in contrast to the previous method of strengthening the potential of the submarine fleet, provided for the establishment of a large number of specific electrical equipment, the import of which was quite an expensive undertaking, especially given the inevitability of questions of its repair and maintenance during subsequent operation, and perhaps even replacement. But, apart from the problem of funds, given the expected scale of use of ship electrical engineering tools, objectively created when implementing the promising plans of the Soviet government to build a world-class Navy, without creating its own base for developing and manufacturing appropriate equipment, the difficulty of implementing these plans automatically arose for the resistance of other world maritime powers, whose electrical industry, in fact, served as the source above the specified import. Therefore, already during the construction of submarines I-st (large torpedo type «Dekabrist») and II-nd (minelayer submarines type «Leninets») of the series, the questions of the development by the Soviet industry of the production of the necessary electrical equipment and apparatuses came to the rank of priority.

Note that the historical facts about the participation of KhEMZ, which at this stage was renamed from “Electrosily No. 1” to “State Electric Machine Building Plant” (GEZ), remained a little in the Soviet six-year submarine program in Ukraine, but still some material is present. Thus, the specification of the Scientific Research Institute of Military Shipbuilding (RIMS) for electrical equipment of submarines of the I-series contains information on the origin of electrical machines and apparatus installed on a submarine. According to this information, on ships «Dekabrist», laid down in accordance with the six-year program during 1927, 42% of the electrical equipment and 26% of the equipment were manufactured on the GEZ with all of the installed nomenclature of power electrical equipment; 12.5% and, respectively, 8.3% – at the Kharkov Electroavod; 45.9% of electric apparatuses were supplied by the “Baltvod” plant; 13.5% – by the “Electric” plant; 12.5% each of the electrical equipment was produced by the “Electrosila” plant and the Nikolayev assembly bureau; the rest of the power electrical equip-

ment must be of foreign origin². So, on the submarines of the I-series, half of the domestic range of electrical machines and a quarter of the equipment were equipped with a GEZ, although it should be recognized that not all of them can be attributed to the “responsible” equipment, if the submarine equipment is properly divided by responsibility. But nevertheless, for example, rowing electric motors, electric motors of the bow horizontal rudders, periscopes, bilge pumps, compressors, etc. GEZ for the I-series ships were not made³.

According to the same kind of RIMS specifications, on submarines of the II series, laid out in 1929-1930, in the general nomenclature of the power electrical equipment of the ship of an electric machine produced by the GEZ, were already 58%, and the equipment – 45.3%⁴, but, for example, rowing electric motors, were still manufactured at the «Elektrosila» plant. Meanwhile, the increase in the share of equipment manufactured at the GEZ, which happened within two years, is obvious, as is the chronological coincidence of this fact with the conclusion in 1926 of an agreement on scientific and technical cooperation ("Technical Assistance Agreement") between the State Electrotechnical Trust (SET) USSR and German Concern «Allgemeine Elektrizitäts Gesellschaft» (AEG) (Novikov, 2006, p. 10), and also with the beginning of the release of electrical engineers at KhTI in 1926. The last event contributed to the influx of scientific and technical personnel prepared by a local university into the GEZ, although with a fairly generalized level of professional qualifications. This was due to the fact that at the Electrotechnical Faculty of KhTI at that time special training in the learning process was not practiced, with the result that the specialty of the graduate was determined on the topic of the graduation project⁵. So, the GEZ got engineers with a broad theoretical base of training in the field of general electrical engineering, but without in-depth knowledge of the specifics of shipboard electrical equipment, which, however, did not prevent the establishment of the Special Sector at the design and technology department (Special SDTP), which focused on shipboard electrical engineering.

A very effective factor in influencing the efficiency of the Special SDTP, with the absolute superiority of inexperienced engineering staff in its staff, was the receipt of relevant scientific and technical information from the AEG concern. But this information was mainly related to the modernization of those products, the nomenclature of which was mastered by GEZ in the

² APRCh, f. P-4217, op. 2, spr. 50, k. 9, 10, 12–20, 26.

³ Ibidem, ark. 9, 10, 13, 16.

⁴ APRCh, f. P-4217, op. 2, spr. 52, k. 10–24, 29, 30.

⁵ APRCh, f. P-1682, op. 1, spr. 191, ark. 8 pw.

pre-war period (Novikov, 2006, p. 10), this was partly due to a certain scientific and technical gap between AEG and leading American, French and British electrical firms formed in the mid-1920s. Thus, given the need for continuous improvement in the characteristics of shipboard electrical equipment, cooperation with a certain German concern did not deprive the Soviet Union of its dependence on imports on the issue of equipping the Navy with electrical machines and equipment of a modern scientific and technical level, since, for example, the level of AEG achieved by the GEZ was not as such by definition. So, the percentage of growth in the share of electrical equipment produced at the GEZ, which we observe in the corresponding specification of the RIMS for submarines of the II series, is a vivid illustration of the limit of feasibility of scientific and technical cooperation with AEG.

Achievements of the first five-year program to increase the power of the submarine fleet of the USSR (1929–1933)

The successful start of the program to re-equip the submarine fleet, manifested in the rapid, appropriately planned rate of creation of submarines I-series, allowed the Soviet government to put on the agenda the question of the possibility of starting a parallel process of expanding the composition of submarines, both in number and in type. In addition, the government plans for the industrialization of the USSR provided for an unprecedented rise in industrial production, which made this possibility quite likely to be realized at the stage of the First Socialist Five-Year Plan (1928-1932). At least, the Soviet party and economic leadership directly linked the first five-year plan of industrialization with the plan to build up the power of the USSR Navy, as evidenced by the beginning of the development of the corresponding program in 1928, with its subsequent approval in early 1929. The submarine fleet of the Soviet Union during 1929-1933 was to be replenished with new types of torpedo ships of small, medium and squadron classes, which required a significant expansion of the range of power equipment in the production programs of electrical engineering plants. But for this, this nomenclature had to be first developed and mastered in production, while taking into account the purpose, conditions and terms of operation of submarines, these developments had to have a modern technical level with the possibility of further improvement.

However, as mentioned above, the experience and knowledge gained by Soviet electric machine builders at the stage of intensive scientific and technical cooperation with AEG proved to be insufficient for establishing

independent design processes for such shipboard electrical equipment that would meet the needs of the submarine fleet under construction. By the way, a similar situation exists in other areas of electrical engineering, which led to the approval of the USSR government in 1929 of an agreement on scientific and technical cooperation of the All-Union Electrical Association, into which the State Electrotechnical Trust was reorganized, this time with the American General Electric Company (GEC) (Annenkov, 2015, p. 11). During 1930-1932, renamed from the State Electro Plant to the Kharkov Electromechanical Plant received from GEC the drawings of modern electric machines and apparatuses manufactured by the company⁶, a number of which were used by the Special SDTP for the needs of the submarine fleet. As a result, already on submarines of the III series (medium torpedo type "Shchuka"), which were laid in 1930, rowing electric motors, like 77.8% of other electric power machines and 73.4% of equipment, were produced by the GEZ⁷. On ships of the V-th series (modernized "Shchuka", which for some time were called the type "Karas"), as well as the VII-th (aka V-bis) and V-bis-2 series, which were laid during 1932-1934, the proportion of power supply of the GEZ's production decreased to 72.4% and 71.0% respectively⁸. This was due to the fact that on submarines of the "Shchuka" type, starting with the V-series, low-pressure compressors equipped with electric motors and control system of the Swiss company Brown-Boveri were installed⁹. On the submarines of the third series of such compressors did not exist¹⁰.

Meanwhile, the squadron and small submarines (respectively the IV and VI series), the proportion of electrical equipment KhEMP remained the same as on ships I and II series, that is – was about half of its total volume. This fact allows us to say that during the first five-year development program of the Soviet naval forces at the KhEMP, specialization began in the development and production of electrical equipment for middle-class submarines. At the same time, the Special SDTP of the plant did not carry out significant research and development (R & D) work on the electrotechnical equipment of submarines of other classes. First of all, this was due to a small staff of scientific and technical workers engaged in the KhEMP R & D in the field of electrical machinery and equipment for the submarine fleet. By the beginning of the 1930s, the number of personnel in this group in the Special

⁶ APRCh, f. P-4217, op. 5, spr. 237, k. 61.

⁷ APRCh, f. P-4217, op. 2, spr. 49, k. 9–21.

⁸ APRCh, f. P-4217, op. 2, spr. 51, k. 9–21.

⁹ Ibidem, k. 17.

¹⁰ APRCh, f. P-4217, op. 2, spr. 49, k. 17.

SDTP did not exceed five people with rare accession to resolve specific issues, if necessary, one or two specialists from other groups of this scientific and technical division¹¹. Thus, at the second stage of the re-equipment of the Soviet military submarine fleet, there was only the formation of a team of scientific and technical workers at KhEMP specialized exclusively in the power supply of submarines and the formation of the material and technical base for the implementation of relevant R & D was started.

Evolution of the role of KHEMP in creating underwater weapons for the implementation of the second five-year program of construction of the soviet navy (1934–1938)

In 1932, given the fairly high results of economic development achieved during the First Five-Year Plan and against the background of the deployment of preparations for a new global world conflict, the possibility of creating a navy (Navy) corresponding to the geographical position of the country and its geopolitical ambitions was considered in the USSR. In preparation for this large-scale event, two new naval formations were organized: in 1932 – the Pacific Fleet, and in 1933 – the Northern Flotilla (from 1937 – the Northern Fleet). According to the adjustment of the plan of the second five-year plan (1933-1937), it was finally decided to start in 1934, the simultaneous filling of all, now four, navies of the Soviet Union (Gribovskij, 2012), but such an approach required the availability of, among other things, a developed branch of ship electrical engineering. Meanwhile, during the 1920s, new electrotechnical production facilities were not created in the USSR, and the Kharkov Turbine Generator Plant (KhTGP) built in the early 1930s was capable of removing the corresponding production loads only from KhEMP, but not with other electric engineering enterprises of the country. So, objectively, in 1934, to start mass production of ship electrical engineering as part of measures to create the Great Navy became possible only at KhEMP. This fact led to the determination by the Soviet government in the same year that the specified enterprise was the main supplier of power electrical equipment for ships of all classes and all coastal defense facilities¹².

At the same time, since despite the mentioned effectiveness of the First Five-Year Plan, its plans were not fully implemented, there was also no ground for hope for the unequivocal fulfillment of the plans of the Second

¹¹ APRCh, f. P-4217, op. 2, spr. 34, k. 21.

¹² APRCh, f. P-4217, op. 4, spr. 2, k. 85.

Five-Year Plan. At the same time, at the time of making a decision on the development of a large Navy, the previous five-year program for the re-equipment of the Baltic and Black Sea fleets had not been completed, not least because of the insufficient development of the power electrical equipment production sector for submarines and the lack of such in the sector power equipment power production ships. Hence, the introduction of broader measures to create the Soviet Navy level of the developed world powers was preceded by the second five-year program of building the Navy 1934-1938, a smaller scale, preparatory nature. During its implementation, it was supposed to give priority to a more streamlined, at that time, submarine shipbuilding, in parallel, significantly improving the relevant domestic scientific and technical potential and creating the basis for further gradual shift of emphasis in the development of the Navy on surface shipbuilding. Within the framework of this conceptual approach, a number of measures were taken at KhEMP aimed at a fundamental change in the existing order of scientific support for the production of naval electrical equipment.

First of all, for the implementation of the second five-year program for the development of the Soviet Navy, the plant was transformed from a purely industrial institution into a research and production organization. The opportunities obtained as a result of this not only optimize measures for adapting borrowed developments with the production conditions available at KhEMP, but also carry out a full cycle of necessary R & D on their own, initially focusing on both the requirements of consumers of the products and the technologies already used at the enterprise. To establish the necessary organizational scientific and technical structure and, at the same time, work towards the creation of power units of automated artillery fire control systems in 1935, Professor Leningrad Polytechnic Institute M. P. Kostenko was assigned to the KHEMP as chief electrician, who prior to this appointment worked as chef-electrician of the Leningrad plant “Electropribor” (Annenkov, 2016, p. 140). According to the structuring of the scientific and technical units of the enterprise under his leadership, the submarine section of the Special SDTP was specialized exclusively in auxiliary electrical equipment of submarines¹³, and for the design of power equipment of their main and combat mechanisms, two more relevant sections were created. However, it should be noted that both of the latter collectives were profiled at the relevant works not only for submarines, but also for surface ships¹⁴. At the same time, the

¹³ APRCh, f. P-4217, op. 2, spr. 1, k. 6–7.

¹⁴ Ibidem, k. 25–38.

scientific and technical divisions of the Special SDTP were charged solely with the development and implementation of systems and aggregates as a whole, and their design was carried out by separate specialized design departments (bureau): machine, hardware and relay, and the necessary research was introduced on the basis of both specialized and electrotechnical factory laboratories¹⁵.

This functional separation allowed us to optimize the work of the scientific and technical team of the KHEMP in creating modern samples of electrical equipment of submarines, which was reflected in the increase of its labor productivity. This factor was decisive at that time, since the second five-year program of rearmament of the Navy was based on the advanced development of the underwater forces¹⁶. However, it was not possible to raise the general level of awareness of the scientific and technical workers of the plant on the achievements of modern world science and electrotechnical production technologies to a level that would allow the development of the necessary systems of shipboard electrical equipment in its own hands. So, both employees of the Special SDTP and designers of factory bureaus resorted to extensive borrowing of foreign design, technological and design solutions to the problems of creating modern electrical equipment¹⁷. The largest "donors" of such borrowings were firms with which the Soviet government had agreements on scientific and technical cooperation at the time, this is Italian «Ansaldo»¹⁸ and British «Metropolitan-Vickers»¹⁹. Where, for some reason, these borrowings did not work out, the designers were forced to build foreign-made components that were purchased abroad, often directly from manufacturers, into the power supply systems of the submarines. For technical support of such operations from the KHEMP to the manufacturers sent specialists of the relevant specialty^{20,21}. However, along with the above, it was during the implementation of the second five-year program of re-equipment of the Soviet Navy that scientific and technical teams of KHEMP began borrowing abroad not only ready technical and technological solutions, but also methods for achieving them²².

¹⁵ APRCh, f. P-4217, op. 2, spr. 34, k. 2.

¹⁶ Грибовский В. Ю (2012), op. cit.

¹⁷ APRCh, f. P-4217, op. 4, spr. 47, k. 145–168.

¹⁸ APRCh, f. P-4217, op. 2, spr. 44, k. 1.

¹⁹ APRCh, f. P-4217, op. 4, spr. 44, k. 172.

²⁰ APRCh, f. P-4217, op. 5, spr. 237, k. 52.

²¹ APRCh, f. P-4217, op. 4, spr. 47, k. 137–144.

²² APRCh, f. P-4217, op. 5, spr. 237, k. 69–70.

The introduced changes in the scientific support of the production of naval power supply made it possible to prepare for the development in production at KhEMP in 1936 a complete set of auxiliary power electrical equipment for submarines of the XI series – minelayer submarines type "Leninets"²³. During the years 1937-1938. Preparations were made for the development in the production of the entire set of power electrical equipment of submarines of the XII series of the "Malyutka" type, X series of the "Shchuka" type, IX-bis series of the "Stalynets" type and XIV series of the "Kreyserskaya" type^{24,25}. So, from 1939 out of five types of submarines that were supplied to the Naval Forces of the USSR, four types were completed with systems of power electrical equipment developed at the KhEMP in full, and one type – only in terms of auxiliary power equipment. At the same time, these systems consisted of machines and devices, which, with the exception of individual component positions, were manufactured at the same enterprise. That is, from 1934 to 1938 the plant was transformed from a purely industrial enterprise into a research and production institution, which is also confirmed by the start of research and development for the needs of the submarine fleet in the following directions: development of equipment for electric torpedoes; creation of automated remote control systems for rowing electric motors and the steering wheel of submarines; design of torpedo tubes of magneto-coal action; development of electrical equipment for experimental submarines of the type "Rado" using a submerged diesel engine²⁶.

The participation of the KHEMP in the strengthening of submarine forces in 1939-1941. In the implementation of the program of the great fleet of the USSR

In 1938, the government of the Soviet Union proclaimed the deployment of measures for the creation of the "Great Navy of the USSR", although, as we see from the preliminary material, the actual implementation of this program began in 1934. However, until 1937, small-tonnage ships dominated construction, the nature of production of which allowed the Soviet government to conceal the true development of the Navy. Since 1938, the number of pledged large-tonnage ships has become so large and predominant that the process of creating the huge navy by the Soviet Union has already

²³ APRCh, f. P-4217, op. 2, spr. 34, к. 11.

²⁴ APRCh, f. P-4217, op. 2, spr. 1, к. 33–34.

²⁵ APRCh, f. P-4217, op. 2, spr. 4, к. 5.

²⁶ APRCh, f. P-4217, op. 2, spr. 1, к. 26, 30, 34.

lost its ability to be hidden. Actually, this is what caused the proclamation of the corresponding program, which in fact has been under way for five years. At the same time, the shift in the Soviet program of the development of the navy to an emphasis on large surface ships did not mean the collapse of submarine construction. Moreover, the construction volumes of submarines remained virtually unchanged due to the stable failure of previous plans for their construction and the corresponding transfer of work in progress to later periods to the detriment of the following.

The rules concluded with the development of the submarine fleet has made certain changes in the operation of the KhEMP as has been the lead organization to ensure submarines power electrotechnics. Thus, the Special SDTP, expanded during 1939 into the Special Design and Technology Department²⁷, the work of this profile was actually divided into current, flow-perspective and promising²⁸. Current were: commissioning; work on the elimination of design errors identified during operation; projects aimed at the urgent replacement by the Navy of the previously supplied power equipment of other manufacturers. Flow-perspective works were: work to improve the technical characteristics of serial products; development of automation systems for power equipment control; projects on the management of ship systems and mechanisms; work on the standardization and unification of electrical equipment of submarines. Worked on new generations of machines and apparatuses, as well as electric power systems built on their basis as a whole, were considered promising. In addition, the projects of the electric part of new generations of mine-torpedo weapons were included in the promising R & D.

Despite the beginning of the Second World War, business trips of KhEMP workers abroad for borrowing, both in the form of scientific and technical information, and through the purchase of components did not stop. At the same time, for this purpose, the plant's specialists visited electrical enterprises of both neutral states and countries of the conflict²⁹. For example, in Germany, factory specialists were sent on a business trip for a period of eight months to the organization of acceptance of custom-made protection sets for generators by the KhEMP a week before the start of the Soviet-German war³⁰. However, in general, the trend towards the growth of foreign scientific and technical borrowings by the KhEMP of the proportion of meth-

²⁷ APRCh, f. P-4217, op. 6, spr. 10, к. 2.

²⁸ APRCh, f. P-4217, op. 2, spr. 255, к. 18–27.

²⁹ APRCh, f. P-4217, op. 6, spr. 3, к. 7.

³⁰ APRCh, f. P-4217, op. 6, spr. 11, к. 17.

odological aspects to direct products or design and technological documentation for their production after the proclamation of the course to create the Great Soviet Navy has been preserved. In the industrial aspect, the period of work of KHEMZ in 1939-1941 differed from the previous ones in the resolution of the issue of the lack of means of producing electric equipment for submarines and a certain qualification and quantitative stabilization of industrial personnel engaged in this process. At the same time, the question of the full-fledged provision of the said production with material and energy resources, planning and organization of efficient intra-plant, intra-and inter-branch specialized cooperation has not been resolved. Therefore, KhEMP was able to carry out the relevant production program only within 40-50%³¹.

Conclusions

The analysis of the KhEMP's work on the creation of a modern Soviet submarine fleet during the interwar period, although certainly quite fluent, nevertheless, given the total absence of historiography of this issue, allowed for the first time, at least, to highlight the dynamics of the degree of participation of the enterprise in question process and determine the main factors influencing the above dynamics. So, we can say that from 1920 until the beginning of the Soviet-German war in 1941, KhEMZ participated in all the activities of the Soviet government aimed at strengthening the submarine forces of the Soviet Navy. His role in these events gradually changed from a purely subsidiary – in the early 1920s in the lead – from the second half of the 1930s, and was due to a corresponding change in the status of the company from adjacent to the main producer of power electrical equipment of Soviet submarines. In turn, the change of this status was achieved through the transformation of KhEMZ from an exclusively industrial organization to a research and production institution, with the formation of factory structures of scientific support for the creation and implementation of specialized products. However, it was not possible to achieve full integration of these structures into the all-Union system of scientific and technical support of shipbuilding, as it was not possible to organize an effective process for manufacturing naval electrical equipment, despite the fact that the plant was equipped with the necessary personnel and equipment. As a result, KhEMP chronically did not fulfill the tasks assigned to it within the framework of the development programs of the Soviet naval forces, which became one of the

³¹ APRCh, f. P-4217, op. 4, spr. 2, к. 31.

factors that disrupted these programs as a whole, starting from the second five-year and by 1941 inclusive. The repressions of the KHEMP management team conducted during 1937-1939 were motivated precisely by its inability to overcome the mentioned shortcomings, although they were presented in the viewpoint of the time to combat “sabotage” and “wrecking” on the basis of class enmity. Meanwhile, the repressive measures to the factory leadership did not bring the expected results.

Thus, we can argue that, firstly, the insolvency of KhEMZ to carry out the programs for strengthening the submarine forces of the Soviet Navy on the eve of World War II was based on the high degree of dependence of the level of scientific support for core production on the timeliness of obtaining relevant foreign borrowings and their quality. Secondly, the weak organizational component became the basic reason for the inefficient use of the plant's scientific and technological potential, and since the repressions were unsuccessful in resolving this issue, this reason was not subjective, but was caused by the objective consequences of the introduction of the Soviet economy management method.

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UDZIAŁ CHARKOWSKIEJ WYTWÓRNI ELEKTROMECHANICZNEJ W TWORZENIU RADZIECKIEJ WOJENNEJ FLOTY PODWODNEJ W LATACH 1920–1941

STRESZCZENIE

W prezentowanym artykule po raz w pierwsze rozpatrzono udział Charkowskiej wytworni elektromechanicznej w tworzeniu Związkiem Radzieckim floty okrętów podwodnych w latach 1920–1941. Ustalono, że w przegłanym okresie rola przedsiębiorstwa w tym procesie wzrosła z zakładu pomocniczego do wiodącej w ZSRR organizacji naukowo-produkcyjnej w zakresie wypracowania oraz wytwarzania systemów siłowego sprzętu elektrycznego dla okrętów podwodnych. Oznaczono, że decydującym czynnikiem wzrostu stopniu udziału ChWEM w programach wzmocnienia sił podwodnych radzieckiej marynarki wojennej

stał się rozwój struktur fabrycznych dla zabezpieczenia naukowego procesów tworzenia produktów profilowych. Jednocześnie ujawniono, że ogólnie potencjał naukowo-techniczny przedsiębiorstwa w okresie międzywojennym wykorzystywano nieefektywnie, w wyniku czego od 1934 r. żaden z programów tworzenia nowoczesnej floty podwodnej nie był przez niego wykonywany w odpowiednim czasie.

Słowa kluczowe:

radziecka marynarka wojenna, siły podwodne, okręty podwodne, marynarkowa inżynieria elektryczna, siłowy sprzęt elektryczny, potencjał naukowo-techniczny, zabezpieczenie naukowe.