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**TÍTULO:** Cooperación militar-técnica ruso-francesa en la segunda mitad del siglo XIX. Ejemplo de la fábrica Chatellerault.

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**RESUMEN:** El artículo discute características clave de la interacción entre el Ministerio de Guerra ruso y el arsenal francés Chatellerault en la segunda mitad del siglo XIX. Se pone énfasis en cuestiones de aceptación militar de las primeras muestras de producción del rifle Mosin de 3 líneas (modelo 1891), construido en la fábrica francesa Chatellerault en 1894-1895 comisionado por el gobierno ruso. El artículo considera las características esenciales de la producción extranjera, así como detalles específicos de la aceptación militar de las primeras muestras de producción de este rifle. Los autores examinaron antecedentes históricos, objetivos y eventos que precedieron una cooperación tan exitosa entre Rusia y Francia. Es interesante que esta fue la primera vez que los receptores militares rusos tuvieron que llevar a cabo sus actividades en el extranjero.

**PALABRAS CLAVES:** Ministerio de Guerra del Imperio Ruso, arsenal francés de Chatellerault, rifle Mosin de 3 líneas (modelo 1891), fábrica de armas Zlatoust, industria military.

**TITLE:** Russian-French military-technical cooperation in the second half of the XIX century. Example of Chatellerault factory.

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**ABSTRACT:** The article discusses key characteristics of the interaction between the Russian Ministry of War and the French arsenal Chatellerault in the second half of the 19th century. Emphasis is placed on issues of military acceptance of the first production samples of the Mosin 3-line rifle (model 1891), built in the French factory Chatellerault in 1894-1895 commissioned by the Russian government. The article considers the essential characteristics of foreign production, as well as specific details of the military acceptance of the first production samples of this rifle. The authors examined historical background, objectives and events that preceded such a successful cooperation between Russia and France. It is interesting that this was the first time that Russian military receivers had to carry out their activities abroad.

**KEY WORDS:** Ministry of War of the Russian Empire, Chatellerault's French arsenal, Mosin 3-line rifle (1891 model), Zlatoust weapons factory, military industry.

**INTRODUCTION.**

Currently, the course on mutual economic sanctions between the European Union and the Russian Federation has reduced military-technical cooperation between them to a minimum. In particular, mutually beneficial economic projects between the French Republic and the Russian Federation

suffered. In this regard, the history of the manufacture of landing ships of the Mistral type for Russia was best known.

Specialists regarding the resumption of military-technical cooperation between the Fifth Republic and Russia do not name the possible dates in the near future. At the same time, to one degree or another, cooperation in the field of high technologies is still preserved. In particular, one can mention the successful activity in Russia of the international high-tech group Safran. Such examples give some hope for the possibility of intensifying business contacts after overcoming the existing political differences.

From this perspective, it is of particular interest to consider examples of successful military-technical cooperation between France and Russia in the historical past, namely, the large-scale and successful interaction of France and Russia in the military-technical sphere in the second half of the 19th century, especially after the conclusion of the Franco-Russian alliance in 1891 the city, which was the predecessor of the Entente.

The article made extensive use of archival data from the Russian State Military Historical Archive, the State Archive of the Tula Region, the Zlatoust City District Archive, the Archive of the Military History Museum of Artillery, Engineering and Signal Corps.

## DEVELOPMENT.

### Research methodology.

In the process of cognition of state-legal phenomena, based on the approach of S.A. Komarov, general scientific methods were used (formal-logical, sociological, systemic, structural-functional, concrete-historical, statistical, ascension from abstract to concrete, etc.); general logical methods of theoretical analysis (analysis, synthesis, generalization, comparison, abstraction, analogy, modeling, etc.); private scientific methods (comparative law, technical and legal analysis, concretization, interpretation, etc.) [Komarov S.A. (2019), p. 33].

**Study results.**

In the stubborn competition that unfolded in 1890–1891 between the rifles of the Belgian L. Nagan and the Russian inventor S. Mosin, the right to arm the Russian army was given to the model of the Russian designer. This event was preceded by multiple military trials, on which the Belgian rifle was initially preferred.

S. Mosin managed to significantly modernize his own model, bringing its basic tactical and technical characteristics to the level of L. Nagan rifle. On the final tests of both samples, the selection committee concluded that the right to arming should be given to a rifle designed by S. Mosin, since its main characteristics corresponded to the Belgian model, while the Russian rifle was made in more artisanal conditions, and, therefore, there was a significant clearance for its subsequent improvement.

The Commission emphasized the great simplicity of manufacturing a Russian rifle, and as a result, its cheapness in production. At the same time, the zeal and cooperation of L. Nagan was appreciated. Despite the fact that the model he proposed was not accepted for service, he was paid a corresponding monetary reward. We note that Minister of War P. Vannovsky in his report to the Russian Emperor Alexander III indicated that “the new model made contains parts proposed by Colonel Rogovtsev, Lieutenant General Chagin, Captain Mosin and gunsmith Nagan, so it’s advisable to give the developed model the name Russian 3 -linear rifle of the 1891 model".

Without detracting from the merits of S. Mosin in the development of the adopted rifle, we can state that some design features were drawn, including from L. Nagan. Meanwhile, in April 1891, the Mosin rifle was adopted by the Russian army [Chumak R.N. (2017), p. 188–223].

The degree of international relations and the level of interstate cooperation between France and Russia contributed to the adoption at a meeting held under the leadership of Minister of War P. Vannovsky, the decision to place an order for the production of a little more than 500 thousand copies of this rifle in France [Mavrodin V.V., Mavrodin Val. B. (1984), p. 151-152].

On the one hand, the development of a new production of rifles at a foreign enterprise was of great industrial interest. In a memorandum of August 23, 1890, that is, even before the adoption of the rifle model 1891, the Russian Minister of War P. Vannovsky reported to Emperor Alexander III, "with the current exchange rate of our ruble, these rifles would cost no more than if they were made at our weapons factories and that the very draft contract guarantees our interests" [3, p. 44].

On the other hand, this decision was also politically motivated, since the Franco-Russian military alliance was concluded in 1891, and France's order to manufacture the latest Russian rifle became its visible embodiment. This circumstance was indicated in his memoirs by the assistant to the chief of the Main Artillery Directorate (hereinafter referred to as GAU), Lieutenant General P. Kryzhanovsky, who was directly involved in the commission for the rearmament of the Russian army on a rifle of the 1891 type [Kryzhanovsky P. A. (1910)].

The French side in the person of Foreign Minister Alexander Ribot guaranteed the priority order of the Russian order in Chatellerault [3, p. 41 vol.]. The contract for the manufacture of 3-line rifles at Chatellerault factory was signed on December 19, 1891 between the French contractor Andrien Trail and Russian representatives, Lieutenant General N. Chagin (member of the GAU Artillery Committee) and Baron L. Frederiks (Russian military agent in France). According to the contract, the contractor committed to make 500 thousand Russian rifles at a price of 59 francs apiece (about 25 rubles) within 37 months [V. Ashurkov (1962), p. 404].

It should be noted that the very advanced French weapons and military industry have long aroused interest among representatives of Russian military-technical thought. Even in the midst of the Eastern (Crimean) war (1853–1856), in July 1855, near Sevastopol, Russian troops seized a sample of the French Tuvenen rifle, “with which all non-commissioned officers in the Zuav regiments were armed.” The trophy was transferred to the exemplary workshop of the Tula arms factory and subjected to detailed study [6].

Immediately after the end of the Crimean War of 1853–1856. Russian military agents arrived in France with the aim of "studying the design of weapons factories, their production, arming troops with handguns and training soldiers to shoot". They visited factories in St. Etienne, Mutzig, Tull, Chatellerault, and the Vincent Rifle School, where the Russians not only got acquainted with production, but also underwent a two-month internship [Chebyshev V.L. (1861), p. 1-36].

Experts from Russia agreed that it was the French model of organizing artillery and arms production that would be most in demand during the reform of the Russian military industry after the unsuccessful Crimean War [Anichkov V.M. (1860), p. 307-311]. Subsequently, the principles of organizing the production and acceptance of military products at Russian defense plants were basically based on the experience of French enterprises, taking into account the Russian specifics of organizing production [V. Ashurkov (1962), p. 102,200; 10].

Not only firearms, but also melee weapons produced at French enterprises were subjected to close scrutiny. So, at the end of 1857, in accordance with the decree of Emperor Alexander II, the Headquarters of the General Feldzeichmeister bought two copies each of “cuirass, broadswords, cavalry and dragoon sabers, hatchets and peak made of cast steel at the French arms factory in Chatellerault, [...] to compare these with weapons manufactured at our factories”. Samples of French cold steel were transferred to the Department of Mining and Salt Affairs of the Ministry of Finance, then, in the spring of 1858, they were delivered to the Zlatoust weapons factory, “in order

to make a comparative test of experience with weapons made at the Zlatoust weapons factory from cast steel of Colonel Obukhov" [11, l 1-2]. Already in May 1858, the arms masters of Zlatoust began comparative testing of the products of the two countries [11, p. 5-6].

Pilot trials included both established and enhanced samples. The first included the standard deflection, "a blow with force against the side of a wooden cone", "felling of a dry solid tree with three blows". The reinforced test consisted of "deflection on an Austrian machine tool and cutting of an iron strip 2 lines thick". The test of the cuirass consisted of "shots from soldier rifles at a distance of 20 fathoms". At the same time, it was decided to reduce the distance to 10 fathoms, as cuirasses of domestic production easily withstood the standard test, therefore, it was surmountable for French samples [11, p. 7-10].

According to the test results, it was revealed that the cold arms of both Chatellerault and Zlatoust can withstand all installed and reinforced samples with slight deviations and are not inferior in quality to each other, which undoubtedly was achieved mainly due to the introduction of a new dressing method in Russian production high-quality cast steel, proposed by the famous metallurgist and manager of the Zlatoust factory P.M. Obukhov [11, p. 11-12; Kavaderov A. (1905)].

French manufacturers, in turn, showed interest in military-technical cooperation with Russia and regarded it as a potential market for their military products. So, in 1859, Chatellerault factory in the person of its representative Mr. Enthoven offered its services to the Russian government as a "supplier of pistols for officers of the 1st Army". Similar proposals were thoroughly considered by the Russian military [13, p. 4–4 vol.].

So, it can be stated that the interaction of Russia with French manufacturers, in particular, Chatellerault's arsenal, had deep roots, and the production of Mosin rifles in the enterprises of the Third Republic was not a surprise.

Note that such Russian-French military cooperation was not episodic in nature. So, in addition to Chatellerault, other French firms were also engaged in the execution of the Russian order for the manufacture of Mosin rifles. So, the manufacture of cartridges for sighting was entrusted to the Zhevelo company, boxes and capping for guns - the office of Le Marchand, tools and accessories - to the Bruno-Hoffmark factory. Finished products were delivered by the French maritime agency D'odiardi from the Chatellerault factory by rail to the port of Dunkirchen and then by sea to the Russian port of Revel. As the Russian military agent in France L. Fredericks reported, "this agency had previously proved itself to be on a very good side" [3, p. 106, 163, 234, 285].

The acceptance of rifles manufactured in Chatellerault was charged with the duties of members of a specially created commission, whose assistance was entrusted to render the Russian military agent in France, Baron L. Frederiks. The members of the commission were experienced weapons experts, Colonel N. Sokerin (chairman), Captain I. Savostyanov, Staff Captain Prince A. Gagarin, Staff Captain V. Giber von Greifendels, Staff Captain A. Kholodovsky [Ashurkov V.N. (1951), p. 55–56; Chelnokov C. (2007)].

According to the terms of the contract, "Russian artillery officers were allowed into the plant during the execution of the order. These officers could be present at the reception and testing of all materials, the testing of rifles with firing and during the verification of finished rifles, without interfering, however, in the technical and administrative part of the production" [3, p. 16]. This was the first time that Russian military receivers had to carry out their activities abroad.

Functioning in Chatellerault in 1894-1895. the Russian selection committee accepted for a shift from five hundred and a half thousand rifles. Her competence also included the acceptance of cartridges and closures manufactured in France.

At the initial stage of rifle production, the percentage of detected defects fit into the permissible 1-4% [16, p. 61; 17, p. 37]. At the same time, "the shooting of the first hundred guns gave 8 guns of unsatisfactory combat; moreover, all 8 guns had a battle to the right; rifles unsatisfactory accuracy of battle, as before, did not occur at all. ... The shooting of the second hundred guns of the same batch ... gave the same general evasion of the battle of all guns to the right". Members of the commission noted that “the calibration of the instruments, on which the correctness of the aiming line is checked, revealed a monotonous disorder of these instruments, which entails the incorrect installation of flies unnecessarily to the left. ... therefore, a certain part of the guns will continue to be supplied with flies mounted somewhat more than it should be to the left” [16, p. 26–26 vol.]. During the acceptance tests, members of the commission revealed cases of weak clamping of bullets in a sleeve, rupture of cupronickel shells of bullets, and also longitudinal rupture of shells [19, p. 30–31, 41, 58, 63–64].

Already after six months of production, marriage was detected sporadically and in much smaller quantities (about 1% in a batch) [16, p. 52-53 vol.]. Such a high result was achieved:

Firstly, due to the joint efforts of the Chatellerault manufacturer and the Russian selection committee as part of the development of production of products new to the French enterprise; for example, when receiving Russian rifles, quite strict requirements were imposed on the interchangeability of component parts [17, p. four].

Chatellerault factory tried to brand most parts of the manufactured 3-line to facilitate further assembly. But, in the initial period of acceptance, the French arsenal did not put the stigma on the trigger in a Russian rifle. Later, Chatellerault's gunsmiths asked the selection committee to change the place of the stigma on the lever of the feeder, since when it is put back in place “there are burrs that have to be cleaned by hand”. It is important to note that the French factory “in principle avoids

all manual work, due to the considerable high cost of manual labor compared to mechanical labor" [16, p. 73, 77–78 vol.].

Finalization of the design of the Russian rifle was made after the "highest approval" of the sample in 1891. During the acceptance work at the Chatellerault factory in 1894–1895, it was revealed that "for some time, the cutoffs-reflectors supplied by the Chatellerault plant, to a large extent, broke or sat in the guns already collected and accepted by the commission." In September 1894, the civilian hire master Ignatovich [his name could not be established] proposed a new constructive solution for the whisper and cut-off reflector, recognized by the French side as "... easier than fabricating the existing whisper and cut-off reflector" [16, p. 118–119].

At the insistence of the Russian side, the manufacturer improved the quality of steel used in the manufacture of bayonets and replaced the design of closures with the option proposed by members of the acceptance committee [16, p. 22; 19, l 8, 79].

Secondly, the development of new technical requirements for the production of military products. So, the main material for the manufacture of small arms was gun steel, a special kind of alloy steel with a high elastic limit. The technology of its production is more laborious and specific, in comparison with the manufacture of ordinary steel. In August 1894, the director of the Chatellerault plant asked the Russian commission to allow the acceptance of war springs made of an uncoordinated steel grade. However, the commission pointed out that when applying this metal grade, rifle scrap increases from an acceptable 6% to 8% per batch. As a result, a joint decision was made that "the finished springs will be subjected to separate tests, and the thin ones will be rejected" [16, p. 71; 17, p. 17].

Thirdly**,** the parties always made mutual compromises. So, in the third quarter of 1894, members of the selection committee revealed a 0.002-inch excess of the maximum permissible diameter

tolerance of 27 rifle barrels, but they were already taken according to the results of additional tests carried out for this reason [16, p. 100–100 rpm; 17, p. 6].

In August 1894, the selection committee rejected 28 of the 100 backs of the butt of the next batch. After urgent appeals by the plant's management, "having examined the 28 noses presented by the plant's director, which served to reject the steel batch, [the Commission] found that the metal defects in these naps in the form of captives and cores are so superficial that they almost disappear when polished, do not while removing the nape from the tolerances given by the patterns" [16, p. 72].

The reason for the above disadvantages was the difference in the manufacture of Lebel and Mosin rifles. Lebel's rifle was made of lower-quality steel and, accordingly, its resource was slightly less than that of the Russian 3-line [18]. Therefore, the development of the Mosin rifle was a technological novelty for the French factory. Fulfillment of the Russian order helped Chatellerault's company survive the crisis and even increase the number of people working on it from 2 to 6 thousand people [Lombard C. (1987), p. 120].

Military-technical cooperation between Russia and French manufacturers has successfully passed more than one test. So, to test the manufactured rifles, both Russian ammunition and French ammunition were used by the Zhevelo company, known for its initiative in the appearance of the now-invariable igniter capsule. The tests performed showed a significantly smaller deviation of the mid-point of hit when firing French cartridges, due to the higher initial flight speed of the bullets [19, l. 9].

Constructive development and improvement continued even after acceptance, when during the transportation of the adopted rifles to the Russian Empire, an additional inspection of the weapon that fell into sea water in June 1894 due to the crash of a ship indicated a complete replacement of

the closure [16, p. 10]. A similar episode was repeated on March 11, 1895, when the French steamer Erato sank with 280 boxes of 3-line rifles on board [3, p. 337].

French and Russian experts in January 1895 stated that “neither the contract, nor the special instructions for receiving 3-line rifles, give instructions on how to shoot guns: from the shoulder or from the machine.” Therefore, Chatellerault engineers developed two sighting machines of new types [19, p. 17-21].

The parties separately resolved the issue of the implementation remaining from the spent cartridges, the closure, the selection committee took care that “... so that it would not be possible to restore their previous shape” [16, p. 9]. Similarly, taking in 1894-1895. More than 500 thousand trilinears produced in France, the Russian side, destroyed technical documentation, patterns and equipment.

Russian Emperor Nicholas II as a token of gratitude to the French gunsmiths presented Mr. Chatellerault a bell made in St. Petersburg, which after consecration was named “Alexandre Nikolas” (its other name is “Russian bell”). It was this bell in 1919 that rang in honor of the ranks of the 32nd Infantry Regiment of the French army returning from the front, and in 1944 - in honor of the liberation of the city from Nazi occupation [Chekalin A. (2014); 23, p. 156].

After the cessation of the production of three rulers in Chatellerault, Russian-French military-technical cooperation continued. Further production of 3-line rifles was transferred to Russian enterprises with the direct participation of French engineers from Chatellerault [Lombard C. (1987), p. 120; 21, l 1–4; Leshchenko Yu.N. (2009), p. 131].

The Mosin rifles manufactured in France and in Russia passed a further test organized by the GAU Artillery Committee in June 1895 in Oranienbaum at the training ground of the Officers Rifle School. From each Russian plant (Sestroretsky, Tula, Izhevsk) and the French arsenal of Chatellerault, 10 units of weapons were taken. A shooting was carried out, an assessment of the survivability of the parts and their interchangeability. During the tests, there were no questions

about the accuracy of the battle; at the same time, the rifles of the Izhevsk and Sestroretsk arms factories showed more wear on the parts after shooting 100 rounds each. Regarding the interchangeability of products, some problems arose only with French-made rifles, namely, “it was completely impossible to insert a cut-off reflector from the rifle of the Sestroretsk factory,” and from rifles of other plants only with great effort”; and yet, according to the results of tests, the GAU Artillery Committee “recognized that all rifles are quite suitable for military armament of troops” [24, p. 105-113].

By 1903, Russian enterprises, with the goal of re-equipping the Russian army, produced 3,401,044 three-rulers, while only about 15% of the total order was taken at Chatellerault’s arsenal [27].

The following enterprises took up the manufacture of Mosin rifles: The Imperial Tula Arms Plant (28875 training and 1777805 combat rifles); Sestroretsk arms factory (5649 training and 428327 combat rifles); Izhevsk arms factory (17419 training and 1142969 military and rifles) [26, p. 97–98 vol.].

**CONCLUSIONS.**

So, as a result of a study of the history and features of the interaction between the Russian Ministry of War and the French arsenal of Chatellerault in the second half of the XIX century, the following conclusions can be drawn:

1. Advanced French weapons have long aroused keen interest among representatives of Russian military-technical thought.

2. Leading military-industrial enterprises in France have always shown economic interest in marketing their products on the Russian market.

3. Military-technical cooperation between Russia and France intensified noticeably after the end of the Crimean War of 1853–1856. A good example is the placement of an order for the production of part of the Mosin rifles required for the Russian army at Chatellerault's French arsenal in 1894–1895.

4. The successful project of manufacturing the Mosin rifle at a foreign enterprise and the subsequent business trips of foreign specialists to Russian arms factories facilitated the exchange of scientific, technical, production and technological experience of arms manufacturers.

**Conflict of interest.**

The authors confirm the absence of a conflict of interest.

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