= Borodino @-@ class battlecruiser =

The Borodino @-@ class battlecruisers (Russian : ???????? ???????? ???? « ?????? ») were a group of four battlecruisers ordered by the Imperial Russian Navy before World War I. Also referred to as the Izmail class , they were laid down in December 1912 at Saint Petersburg for service with the Baltic Fleet . Construction of the ships was delayed as many domestic factories were overloaded with orders and some components had to be ordered from abroad . The start of World War I slowed their construction still further as the imported components were often not delivered and domestic production was diverted into areas more immediately useful for the war effort .

Three of the four ships were launched in 1915 and the fourth in 1916 . Work on the gun turrets lagged , and it became evident that Russian industry would not be able to complete the ships during the war . The Russian Revolution of 1917 put a stop to their construction , which was never resumed . Although some consideration was given to finishing the hulls that were nearest to completion , they were all eventually sold for scrap by the Soviet Union . The Soviet Navy proposed in 1925 to convert Izmail , the ship closest to completion , to an aircraft carrier , but the plan was cancelled after political maneuvering by the Red Army led to funding not being available .

= = Design and development = =

After the end of the Russo @-@ Japanese War of 1905 , the Russian Naval General Staff decided that it needed a squadron of fast " armoured cruisers " that could use their speed to engage the leader of an enemy 's battle line , much as Admiral T?g? had done against the Russian fleet during the Battle of Tsushima . Initially the Naval General Staff wanted a ship with high speed (28 knots or 52 kilometres per hour or 32 miles per hour) , 12 @-@ inch (305 mm) guns , and limited protection (a waterline belt of 190 mm or 7 @.@ 5 in) ; the Emperor approved construction of four such ships on 5 May 1911 , but the Duma session ended before the proposal could be voted on . Preliminary bids for the ships were solicited from private builders , but the bids proved to be very high , leading to a reconsideration of the requirements . A new specification was issued on 1 July 1911 by the Naval General Staff for a ship with a speed of only 26 @.@ 5 knots (49 @.@ 1 km / h ; 30 @.@ 5 mph) and with armour increased to 254 mm (10 in) . Armaments were increased to nine 14 @-@ inch (356 mm) guns in three non @-@ superfiring triple @-@ gun turrets , based on a false rumor that the Germans were increasing the caliber of their guns . The Russian Navy believed that widely separating the main gun magazines improved the survivability of the ship , and that under a superfiring arrangement , muzzle blast would hurt the sailors manning the gun sights in the lower turrets through the open sighting hoods on the turret roofs .

The Naval Ministry solicited new bids on 8 September from 23 shipbuilders , domestic and foreign , but only seven responded , even after the deadline was extended by a month . A number of designs were rejected for not meeting the revised criteria . In the meantime , the Artillery Section of the Main Administration of Shipbuilding had decided that it preferred a four @-@ turret design , and new bids were solicited in May 1912 from the leading contenders from the first round of bidding . The eventual winner was a design by the Admiralty Works in Saint Petersburg , which had the extra turret added to a new hull section inserted into the original three @-@ turret design .

The Duma approved construction in May 1912 , before the design was finalised , and allocated 45 @.@ 5 million rubles for each ship . However , the increase in armaments and consequential increase in the size of the ships raised their estimated cost by seven million rubles each , and some money was diverted from the budget for the Svetlana @-@ class cruisers . Orders were placed on 18 September 1912 for a pair of ships each from the New Admiralty Shipyard and the Baltic Works . The first pair was to be ready for trials on 14 July 1916 and the second pair on 14 September 1916 .

Full @-@ scale armour trials revealed serious weaknesses in the proposed protection scheme . The trials employed the obsolete ironclad Chesma , modified with armour protection identical to that used by the Gangut @-@ class battleships then under construction . The deck and turret roof armour proved to be too thin , and the structure supporting the side armour was not strong enough

to withstand the shock of impact from heavy shells .

The design of the Borodino @-@ class ships was modified as a consequence , which slowed their construction . Deck armour was reinforced with extra plates , the turret roofs were increased to a thickness of 150 mm (5 @.@ 9 in) , and the side and roof of the conning tower were increased by 100 mm (3 @.@ 9 in) and 125 mm (4 @.@ 9 in) respectively . To compensate for the additional weight , the rear conning tower was removed entirely and the thickness of the main belt was reduced by 4 @.@ 5 mm (0 @.@ 18 in) . Mortise and tenon joints were introduced between the armour plates along their vertical edges to better distribute the shock of a shell impact and to lessen the stress on the supporting hull structure . The launching of the first pair of ships was postponed by six months because of these changes , plus delays imposed by the large number of ship orders already in hand .

The outbreak of the First World War in 1914 caused further delays as a number of components had been ordered from foreign manufacturers . As an example , the gun turrets rested on 8 @-@ inch (203 mm) roller bearings made in Germany , but attempts to order replacements from the United Kingdom and Sweden proved futile , as no company was willing and able to make the bearings . Components for the turbines of Navarin and Izmail that had been ordered from AG Vulcan in Germany were seized by the German government at the beginning of the war and used in the construction of the two Brummer @-@ class cruisers .

= = = General characteristics = = =

The Borodino @-@ class ships were 223 @.@ 85 metres (734 ft 5 in) long overall . They had a beam of 30 @.@ 5 metres (100 ft 1 in) and a draught of 8 @.@ 81 metres (28 ft 11 in) at full load . The ships displaced 32 @,@ 500 long tons (33 @,@ 000 t) normally , and 36 @,@ 646 long tons (37 @,@ 234 t) at (full load) . High @-@ tensile steel was used throughout the hull with mild steel used only in areas that did not contribute to structural strength . The hull was subdivided into 25 transverse watertight bulkheads and the engine room was divided by a longitudinal bulkhead . The double bottom had a height of 1 @.@ 275 metres (4 ft 2 @.@ 2 in) , while the vitals of the ship were protected by a triple bottom that added an extra 875 millimetres (34 @.@ 4 in) of depth . The design called for a freeboard of 8 @.@ 89 metres (29 ft 2 in) forward , 6 @.@ 24 metres (20 ft 6 in) amidships and 6 @.@ 49 metres (21 ft 4 in) aft . The ships were fitted with three Frahm anti @-@ rolling tanks on each side .

= = = Propulsion = = =

Two sets of steam turbines were ordered on 22 April 1913 from the Franco @-@ Russian Works in Saint Petersburg for the Admiralty @-@ built ships ; the Baltic Works built its own turbines and one pair for Navarin was ordered by the AG Vulcan Stettin in Germany , with some components ordered from abroad . The wing propeller shafts were powered by high @-@ pressure impulse @-@ reaction turbines , and the inboard shafts were powered by low @-@ pressure reaction @-@ type turbines . They produced a total of 66 @,@ 000 shaft horsepower (49 @,@ 000 kW) and were designed to be overloaded to 90 @,@ 000 shp (67 @,@ 000 kW) . The turbines were powered by 25 triangular Yarrow boilers with a working pressure of 17 kg / cm2 (1 @,@ 667 kPa ; 242 psi) . The forward boilers were grouped into three compartments with three oil @-@ fired boilers in each compartment . The rear boilers were split into four compartments with each containing four coal @-@ fired boilers fitted with oil sprayers . Maximum speed was estimated at 26 @.@ 5 knots , although forcing the machinery would increase it to 28 @.@ 5 knots (52 @.@ 8 km / h ; 32 @.@ 8 mph) . Coal capacity was 1 @,@ 974 long tons (2 @,@ 006 t) and fuel oil capacity was 1 @,@ 904 long tons (1 @,@ 935 t) , which gave an estimated range of 2 @,@ 280 nautical miles (4 @,@ 220 km ; 2 @,@ 620 mi) at full speed .

The Borodino @-@ class ships had six turbo generators and two diesel generators , each rated at 320 kilowatts (430 hp) . These were divided among four compartments on the platform deck , two forward and two aft of the machinery . The generators powered a complex electrical system that

combined alternating current for most equipment with direct current for heavy @-@ load machinery such as the turret motors .

= = = Armament = = =

The main armament consisted of four electrically powered turrets , which were never built . The turrets were designed to elevate and traverse at a rate of 3 ° per second . Each would have had three 52 @-@ calibre 356 @-@ millimetre (14 in) Model 1913 guns . The guns could be depressed to ? 5 ° and elevated to + 25 ° . They could be loaded at any angle between ? 5 ° and + 15 ° ; the expected rate of fire was three rounds per minute . At full load , 80 rounds per gun could be carried . The guns fired 747 @.@ 6 @-@ kilogram (1 @,@ 648 lb) projectiles at a muzzle velocity of 731 @.@ 5 m / s (2 @,@ 400 ft / s) ; this provided a maximum range of 23 @,@ 240 metres (25 @,@ 420 yd) .

The secondary armament consisted of twenty @-@ four 55 @-@ calibre 130 mm Pattern 1913 guns mounted in casemates . A pair of casemates were situated on each side , below the three rear turrets ; near the forward turret were six additional casemates , two of which were directly above the middle pair . This positioning reflected the Naval General Staff 's prediction of the most likely direction of attack by torpedo boats .

The anti @-@ aircraft armament was intended to be four 38 @-@ caliber 64 @-@ millimetre (2 @.@ 5 in) anti @-@ aircraft guns fitted on the upper deck with 220 rounds stored per gun . Four 75 @-@ millimetre (3 @.@ 0 in) guns were to be mounted in pairs on the main turret roofs for sub @-@ caliber training with the main guns . Six underwater 450 @-@ millimetre (18 in) torpedo tubes were fitted , three on each broadside ; they were provided with a total of eighteen torpedoes .

= = = Fire control = = =

The fore and aft main gun turrets were given a 6 @-@ meter (19 ft 8 in) rangefinder , and there was another 5 @-@ metre (16 ft 5 in) unit on top of the conning tower . These would provide data for the Geisler central artillery post computer , which would then transmit commands to the gun crew . The mechanical fire @-@ control computer would have been either a Pollen Argo range clock , which had been bought in 1913 , or a domestically designed Erikson system .

= = = Protection = = =

The trials with the Chesma greatly affected the armour protection design of the Borodino @-@ class ships . The Krupp cemented @-@ armour plates were sized to match the frames to provide support for their joints , and they were locked together with mortise @-@ and @-@ tenon joints to better distribute the shock of a shell 's impact . The 237 @.@ 5 millimetres (9 @.@ 35 in) waterline belt covered the middle 151 @.@ 2 metres (496 ft 1 in) of the ship . It had a total height of 5 @.@ 015 metres (16 ft 5 @.@ 4 in) , 3 @.@ 375 metres (11 ft 0 @.@ 9 in) of which was above the design waterline and 1 @.@ 64 metres (5 ft 5 in) below . It was backed by 75 millimeters of wood to make a better fit between the hull and the armour . The remaining portion of the waterline was protected by 125 @-@ millimetre (4 @.@ 9 in) plates backed by 50 millimetres (2 @.@ 0 in) of wood . The upper belt was 100 millimetres (3 @.@ 9 in) thick and had a height of 2 @.@ 89 metres (9 ft 6 in) . It thinned to 75 mm forward of the casemates all the way to the bow . The rear portion of the forecastle deck was protected by an upward extension of the upper belt in the area of the forward barbettes and the upper casemates . The upper casemates themselves were protected from axial fire by 100 mm transverse bulkheads . Behind the side armour was an inboard longitudinal splinter bulkhead that was 50 millimetres (2 @.@ 0 in) thick between the middle and lower decks . This decreased to 25 millimetres (0 @.@ 98 in) between the middle and upper decks . The bulkhead sloped away from the edge of the lower deck to the lower edge of the armour belt with a total thickness of 75 mm . The slope was one 50 mm plate of Krupp non @-@ cemented armour (KNC) on a 25 mm nickel @-@ steel plate . The forward end of the armoured citadel was

protected separately and the transverse bulkhead was therefore only 75 mm thick . The rear bulkhead had no other protection and was 300 millimetres (11 @.@ 8 in) thick between the middle and lower decks , decreasing to 75 mm at the level of the armour belt .

The main gun turrets had sides 300 mm thick with 150 mm roofs . The gun ports were protected by 50 mm plates , and 25 mm bulkheads separated each gun . The barbettes were 247 @.@ 5 mm (9 @.@ 74 in) thick , decreasing to 147 @.@ 5 millimetres (5 @.@ 81 in) when behind other armour . They were shaped like truncated cones which matched the trajectories of descending shells and thus lessened their protective value . The conning tower was 400 millimetres (15 @.@ 7 in) thick , reduced to 300 mm below the upper deck . The funnel uptakes were protected by 50 mm of armour . The upper deck was 37 @.@ 5 millimetres (1 @.@ 48 in) thick while the middle deck consisted of 40 @-@ millimetre (1 @.@ 6 in) plates of KNC on 25 mm of nickel @-@ steel over the armoured citadel . Underwater protection was minimal : there was only a 10 @-@ millimetre (0 @.@ 39 in) watertight bulkhead behind the upward extension of the double bottom , and even this was thinner as the hull narrowed towards the end turrets .

= = Construction = =

All four ships were officially laid down on 19 December 1912 , but work did not begin until March ? April 1913 . After a progress review on 4 June 1914 , launching of the first pair of ships was delayed until October 1914 . When World War I began , the hull of Izmail , the most advanced ship , was judged 43 percent complete , with the others lagging considerably behind . The war caused more delays , including problems obtaining imported components , and the ships were competing for scarce resources with other production deemed necessary for the war . Three of the four ships were launched in 1915 , but it was clear that Russian industry would not be able to complete them during the war , mostly because the turrets were seriously delayed . They were reclassified as 2nd rank projects by the Main Administration of Shipbuilding in 1916 .

A number of plans were made for the post @-@ war completion of the ships , including modifying the turrets to load at a fixed angle of + 4 ° to reduce the weight and complexity of the loading equipment . Another intended change was to lengthen the funnels by 2 metres (6 ft 7 in) to minimise smoke interference with the bridge , as this had been noted as a problem on the Gangut @-@ class dreadnoughts . There were suggestions to improve the machinery with geared turbines , turbo @-@ electric drive , or Föttinger 's hydraulic transmission , but these were more theoretical than practical .

After the February Revolution , the condition of the ships was assessed on 28 April 1917 . The ship that was furthest along was the Ismail : her hull , engines , and boilers were around 65 % complete , and her armour was 36 % complete . Her turrets , however , were not expected to be completed until 1919 . The Congress of Shipyard Workers decided to continue work on the Izmail in mid @-@ 1917 , but only to provide jobs . The Provisional Government halted all work on Borodino , Kinburn , and Navarin on 24 October 1917 , and the Soviet Supreme Naval College ordered work on Izmail halted on 14 December 1917 .

After the end of the Russian Civil War the victorious Bolsheviks considered finishing Izmail , and possibly Borodino , to their original design . It would have taken at least two years to build all of Izmail 's turrets , even if enough guns had been available . Ten had been delivered by Vickers before the Revolution and one gun had been completed domestically in 1912 , but the prospects that more guns could be purchased from Vickers or that the Soviets could make more were not promising , given the state of their heavy industry in the wake of the Civil War . Another problem was the complicated electrical system ; it could not be completed under current conditions , and at least twenty months would be required to replace it with a simpler system .

The Soviets considered finishing Kinburn and Navarin to a modified design that featured 16 @-@ inch (410 mm) guns ; a two @-@ gun turret weighed slightly less than a triple 14 @-@ inch gun turret . Four proposals were made with various changes to the turrets ' armour scheme , but none were accepted , not least because the prospects of actually acquiring such guns were minimal . Domestic industry was not capable of building such large guns and they were not able to purchase

the guns from any foreign company . Other ideas were examined for the three less complete ships . These included converting the hulls to cargo ships , passenger liners , or 22 @,@ 000 @-@ long @-@ ton (22 @,@ 000 t) oil barges , but most of the ideas were rejected as the hulls were thought to be too large and unwieldy for the proposed alternative uses . None of the proposals was accepted , and all three of the less complete ships were sold to a German company for scrap on 21 August 1923 to raise much @-@ needed cash for the government .

The Operational Administration of the Soviet Navy worked out the requirements in May 1925 for a conversion that would have made Izmail into an aircraft carrier with a top speed of 27 knots (50 km / h ; 31 mph) and a capacity of fifty aircraft . She would have been armed with eight 183 @-@ millimetre (7 @.@ 2 in) guns and her armour reduced to a maximum of 76 millimetres (3 @.@ 0 in) . This proposal was approved by Alexey Rykov , Chairman of the Council of the People 's Commissars on 6 July 1925 . The plan was cancelled on 16 March 1926 after the Red Army managed to gain control of a commission appointed to review the needs of the Navy , and the Army was strongly opposed to spending additional money on naval projects . She was scrapped beginning in 1931 in Leningrad .

= = Ships = =

The ships were named after battles fought by the Russian Empire :