

## THE TWO BATTLESHIPS THAT WERE NEVER BUILT IN RIJEKA – THE “IMPROVED TEGETTHOFF-CLASS” AND THE GANZ-DANUBIUS

Dva bojna broda koja nikad nisu izgrađena  
u Rijeci – “poboljšana klasa *Tegetthoff*  
(Ersatz Monarch)” i *Ganz-Danubius*

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### *Summary*

*In February and March 1911 the Hungarian and Austrian delegations voted for the extraordinary credit of 312 million Crowns allowing the construction of the four dreadnoughts of the Tegetthoff-class. In December of the same year the Navy begun the planning works on the following dreadnought-class. According to the international trends, the future ships had to be bigger, better protected and with a heavier main armament, which meant a greater calibre. The Naval Technical Committee (NTC) made a series of predesigns of 23 000-25 000 ton ships, with 8-10 pieces of 34,5 cm or 35,5 cm guns between December 1911 – March 1912. The Navy preferred the heavier, 35,5 cm calibre. The NTC in May 1912 made a new series of 25 200 ton designs.*

*On 7. July 1912 the Navy requested the Ganz-Danubius shipyard in Rijeka, to make an own 24 500 ton battleship design. The tonnage limit was caused by the need to fit the ship into the greatest floating dock of the Navy (Dock No. 22). In early 1913 the Ganz-Danubius presented its own design. On the basis of the 7. July specifications the NTC presented its own 24 500 ton design, which later become the basis of the final design. The Ganz-Danubius ship was shorter and beamier, a more stable gun platform, than the NTC ship. Her greatest disadvantage was her ina*

*The Navy favoured the NTC design, and in April 1913 fixed the arrangement of the main armament: two triple turrets fore and aft and two superimposed twin turrets. After a successful test of the torpedo-protection system on a 1:1 section (Sprengobjekt) on 10. June 1914, the final design was approved by the Navy on 1. July 1914.*

*After a long series of political debates, in May 1914 both delegations voted for a new extraordinary credit of 426 million Crowns, which included the costs of the four new battleships. As in 1911, the Navy made an agreement with the Hungarian government in April 1914 on the distribution of the ship orders. On the basis of archive materials, two of the four battleships were planned to build in Rijeka, but because alternative plans existed, and there is no sign of an existing written formal agreement in the Kriegsarchiv, Vienna, this is only probably, but not a fact.*

**Key words:** *Ganz-Danubius Rijeka, two battleship planned, dreadnought-class*

In February and March 1911 the Hungarian and Austrian delegations voted for the extraordinary credit of 312 million Crowns<sup>1</sup> allowing the construction of the dreadnoughts of the *Tegetthoff*-class. In the summer of the same year started the story of the planned new dreadnought-class, which ended in February 1915 with the cancellation of the full program, caused by the Great War. Two of the four battleships were planned to build in the Ganz-Danubius shipyard Rijeka, and that would have been the greatest order in the history of the yard.

The best known and most popular name of this planned, but never built class, “Ersatz Monarch” originated from the leading article of August 1913 number of “Die Flagge”, the monthly magazine of Austrian Navy League: “The Monarch-class must be replaced.” In the official files the Navy never called this class “Ersatz Monarch” (in fact this type of designation was in use in the Imperial German Navy), the designs were labelled simply as “23 400 ton battleship” or “24 500 ton battleship”, and later as “Enlarged Tegetthoff-class” or “Improved Tegetthoff-class”.

On 3<sup>rd</sup> June 1911 three weeks before the launch of the first Austro-Hungarian dreadnought, *Viribus Unitis*, the Navy started the planning works on the second dreadnought class. According to the international trends, the future ships had to be larger, better protected and with a heavier main armament, which meant a greater calibre.<sup>2</sup> The Škoda Works in April 1911 submitted to the Navy plans for 34.5 cm twin and triple turrets, with any-elevation loading system.<sup>3</sup>

<sup>1</sup> £ 1=24 Crowns

<sup>2</sup> The so called “calibre race” started in 1909. Because the armour piercing capacity of the 30.5 cm gun proved to be insufficient against the newer, better protected battleships, the Royal Navy introduced the 34.3 cm gun in 1909, appeared first on the ships of the *Orion*-class. The US and the Imperial Japanese Navy introduced the 35.6 cm calibre two years later. The Royal Navy introduced an even greater calibre, 38.1 cm in 1912. The German Navy introduced the 38 cm gun in 1913. Of the Mediterranean Powers, only the French succeeded to introduce a new calibre, 34 cm. The plans of the other sea powers to introduce a calibre greater than 30.5 cm, failed. The 1922 Washington Treaty put an end to the calibre race.

<sup>3</sup> KA (Kriegsarchiv, Wien) MS/PK (Marinesektion/Präsidialkanzlei) I-4/12 1183 ex 1912. The Škoda worked out two variants: a similar to the contemporary British system, and a more complicated.

In the worldwide climate of navalism the Austro-Hungarian Navy needed for a new dreadnought-class for three reasons: first, the Navy had to counterbalance the eternal rival, Italy's plan for new battleships, second, with the Italian-Austro-Hungarian Naval Convention of 1913, the fleet of Austria-Hungary became a Mediterranean factor instead of a mere coastal defence force, and third, in that times to maintain the status of great power was impossible without dreadnought-type battleships. In the permanent Balkan-crisis of 1912-1913 the battleships of the Imperial and Royal Navy (*Radetzky-class*, *Tegetthoff-class*) also proved to be very effective tools of power projection.<sup>4</sup> The Navy wanted to start the construction as fast as technically possible (i. e. in 1913), but the political and financial situation of the Monarchy rendered possible the start of the building only in 1914/1915, which failed by the outbreak of the World War.

### THE DESIGNING PROCESS

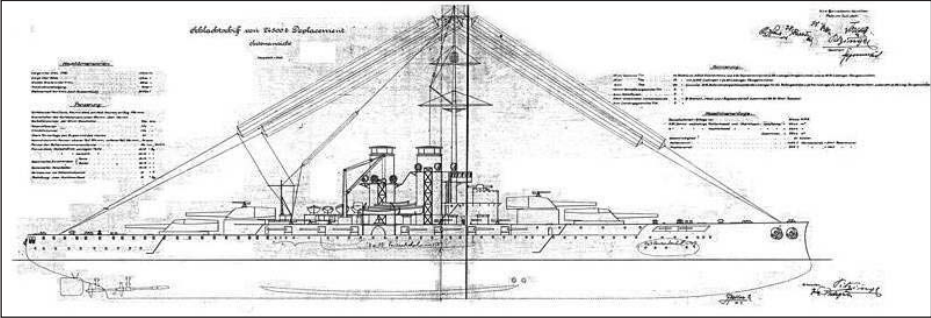
The Austro-Hungarian Navy drew up the first specifications for the future battleship on 3rd June 1911. The Naval Technical Committee (NTC, Marinetechnische Komitee) presented two series of designs: a 22 000 ton ship with 30.5 cm guns and a 23 400 ton ship with 34.5 cm guns. The interesting particular of these designs was the using of twin casemates for the secondary (15 cm) armament. Due to technical problems twin casemates were rejected in early 1912.

In February-March 1912 the Navy made a series of displacement calculations with different armament and belt armour. Beside the 34.5 cm calibre the Navy studied the possibility of introducing the 35.5 cm calibre,<sup>5</sup> and ordered the Škoda to work out the designs of 35.5 cm gun turrets. On the basis of these calculations on 11<sup>th</sup> March 1912 the Navy drew up new specifications for the battleships: a ship with limited tonnage of 23 400 ton and with 34.5 cm or 35.5 cm (4×2) main armament, and an other without tonnage limit and with 35.5 cm main armament. All the ships had to have raised forecastle-deck to improve seagoing performance and to save weight. The 2/5 of the boilers had to be oil-fired. The Navy requested three shipyards, the Stabilimento Tecnico Triestino (STT), the Ganz-Danubius, the Cantiere Navale Triestino of Monfalcone (CNT), and the NTC to make two series of preliminary designs on the basis of these specifications.<sup>6</sup>

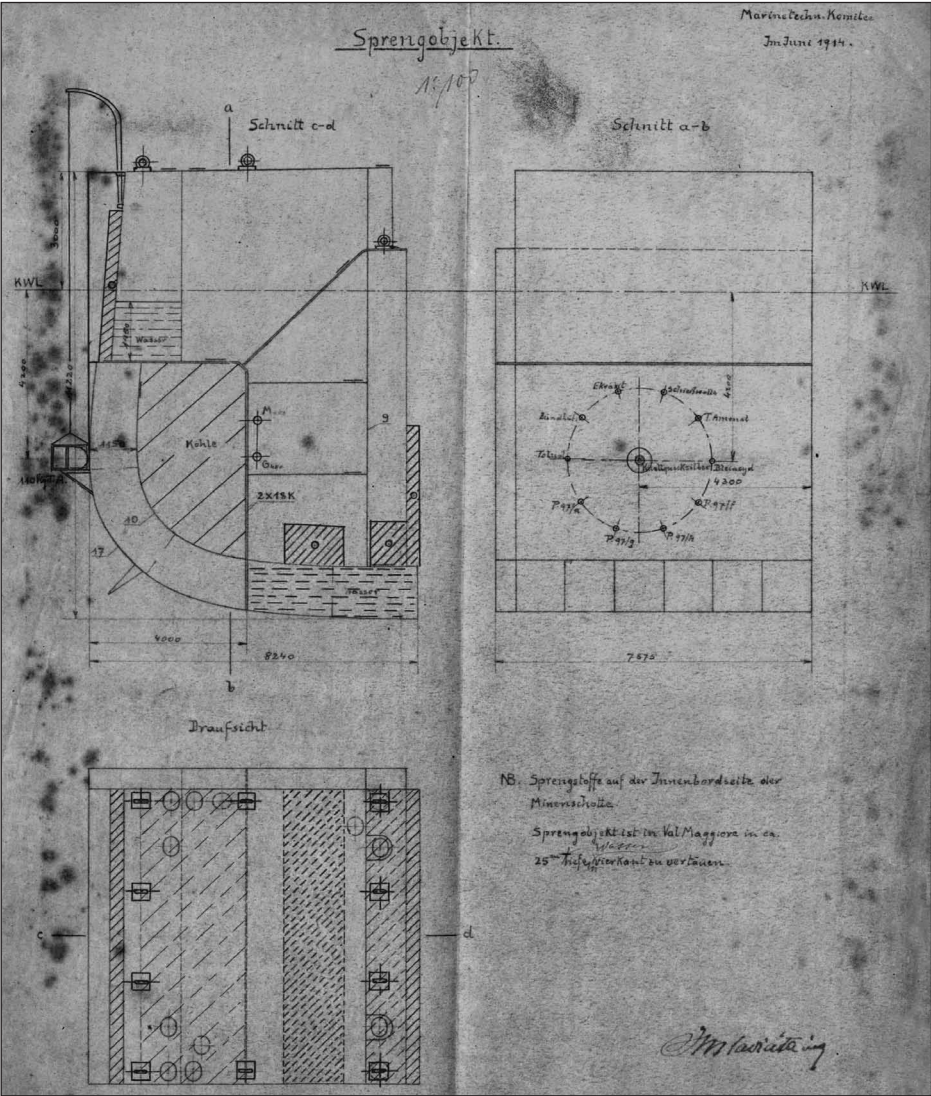
<sup>4</sup> See Tibor Balla: *The Military Participation of the Austro-Hungarian Monarchy in the Settlement of the Scutari-crisis* In: AARMS Vol. 4 issue 1 (2005); and Paul G. Halpern: *Anton Haus. Österreich-Ungarns Großadmiral*. Graz, 1998.

<sup>5</sup> KA MS/PK I-4/12 890 ex 1912. The projectile of the 34.5 cm gun weighted 650 kg, and the 35.5 cm's 700 kg. The German Krupp had a 35.5 cm gun, but their projectile was much lighter, 610 kg.

<sup>6</sup> KA MS/PK I-4/12 890 ex 1912



■ Figure 1



■ Figure 2

On 1<sup>st</sup> April 1912 the Škoda sent the drawings of the 34.5 cm twin and triple gun turrets to the three shipyards and the NTC, but the 35.5 cm drawings were not finished in time. The NTC, the abovementioned yards and engineer Silvius Morin presented their designs, altogether 25 variants and subvariants to the Navy in May-June 1912. Unfortunately, the designs of the STT (five variants) and of Morin are completely missing from the files of the Präsidialkanzlei in the Kriegsarchiv, Vienna. Because the 35.5 cm drawings were not in hand, most of the competitors made their designs with 34.5 cm armament. The Ganz-Danubius, presented only a 23 400 ton design, referring to the missing 35.5 cm drawings. The NTC presented a 23 400 ton design (3 variants) and a 25 200 ton design (12 variants), and the CNT presented a 23 400 ton, a 25 800 ton and a 27 000 ton designs, the last two without any technical detail.<sup>7</sup>

	<b>NTC 23 400 ton</b>	<b>NTC 25 200 ton</b>	<b>Danubius 23 400 ton</b>	<b>CNT 23 400 ton</b>
<b>Dimensions in m</b>	171×28	175×28.5	161×29.2	<b>164×28</b>
<b>Power in Hp</b>	30 000	31 000 <sup>8</sup>	30 000	<b>30 000</b>
<b>Speed in knots</b>	21.3	21.2	21	<b>21</b>
<b>Armour in mm</b>	300 belt 38 deck	340 belt 38 deck	300 belt 36-48-63 deck	<b>300 belt</b>
<b>Armament</b>	<b>4×2 34.5 cm</b>	<b>10-13×34.5 cm</b>	<b>4×2 34.5 cm</b>	<b>4×2 34.5 cm</b>

The Danubius design had the second best torpedo protection system after the NTC 25 200 project. The distance between the ships side and the torpedo bulkhead in the NTC project<sup>9</sup> was 4.1 m, and in the Danubius's 3.6 m, but the torpedo-bulkhead of the Danubius was thicker (50 mm instead of 38 mm). In the other designs these distances were only 2.9 or even 1.7 m.<sup>10</sup>

On 25<sup>th</sup> June 1912 a board headed by Vice-Admiral Karl Kailer von Kaltenfels examined the designs, and chief naval architect, Franz Pitzinger (who also signed the NTC designs) made brief technical commentaries on them. Because the naval budget of 1913 made not possible the start of the building of the new battleships, the board considered the 23 400 ton battleship too small. They wanted a ship with ten heavy guns instead of eight, with a displacement of about 24 500 ton. This ship could fit into the greatest existing floating dock of

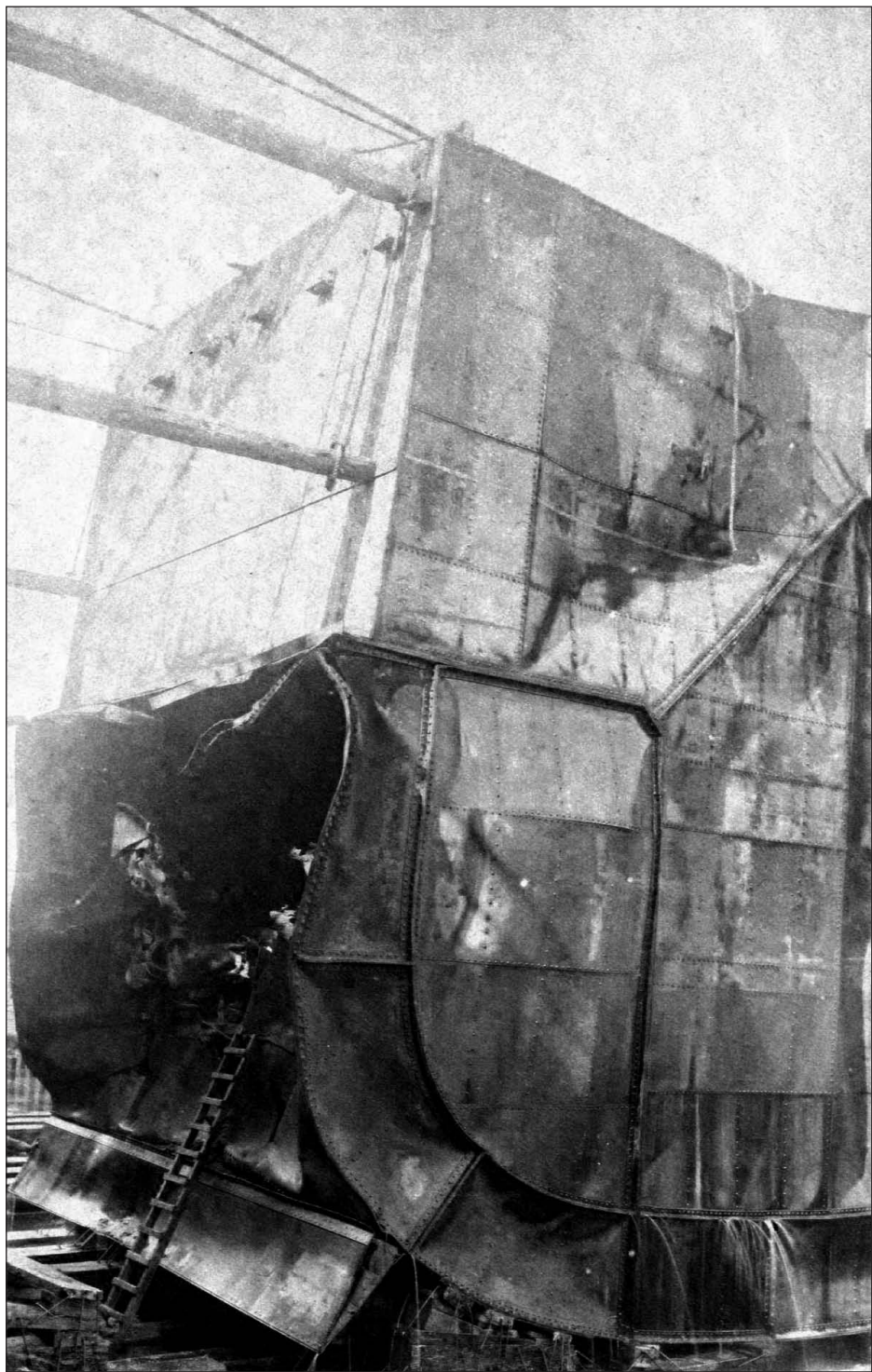
<sup>7</sup> KA MS/PK I-4/12 2388 ex 1912

<sup>8</sup> A variant with 36 000 Hp, 22,2 knots.

<sup>9</sup> KA MS/PK I-4/12 2388 ex 1912. The NTC's torpedo protection system was based on an article published in the December 1911 issue of the "Rivista Marittima". This system was a great improvement over the one used in the 1911 design.

<sup>10</sup> KA MS/PK I-4/12 2388 ex 1912





■ *Figure 3*

the Navy, Dock No. 22 without any problem of stability.<sup>11</sup> On the basis of the board's decision the Navy on 7<sup>th</sup> July of 1912 drew up a newer and final specification. The particulars of the new specification were the following: displacement of 24 500 ton, ten pieces of 35 cm guns in twin and triple turrets, eighteen pieces of 15 cm guns, 300 mm belt and a speed of 21 knots.<sup>12</sup>

The Navy decided that the guns of the future battleship would be yet another new calibre: 35 cm (349.5 mm). The weight of the projectile of these guns was 635 kg.<sup>13</sup> Future researches may reveal the background of this decision. In July 1912 the Navy asked the Škoda to work out the designs of the new, 35 cm twin and triple turrets. On the order of the NTC's Artillery Department, headed by Rear-Admiral Emil Fath, the Škoda returned to the simpler and more reliable fixed-elevation loading system.<sup>14</sup>

In July of 1912 the Navy asked the same three shipyards as in March, and the NTC to make designs on the basis of the new specifications. In the Kriegsarchiv, Vienna, in the files of the Präsidiakanzlei I have found only the design of the Danubius. Fortunately, I have found the NTC design in the Archives of the Hungarian Technical and Transport Museum.<sup>15</sup> The NTC presented its design to the Navy in January 1913, the Ganz-Danubius in March of the same year. The NTC made two alternatives: the same ship, with two triple and two twin turrets, but in the first alternative the twins superimposed over triples, in the second alternative triples superimposed over twins, as it can be seen on a drawing made by Škoda in June 1912. From the first step the Navy favoured the first alternative: after the turning out of stability problems on the trials of *Viribus Unitis* in October 1912, they did not want superimposed triple turrets.<sup>16</sup> The Ganz-Danubius made only one design, without any reference to the arrangement of the turrets. On the evidence of the sketchy drawings of the shipyard it's impossible to establish of the precise arrangement of the turrets.<sup>17</sup>

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<sup>11</sup> The lifting capacity of this dock was originally 22 000 ton, but after an improvement it was augmented to 23 200 ton. The January 1913 24 500 ton NTC design's displacement could be reduced to 23 107 ton, unloading a part of the ammunition and fuel, without losing the stability, but in the case of the 25 200 ton design it was impossible. The Navy planned to build a new, 40 000 ton floating dock in Germany for 8.4 million Crowns.

<sup>12</sup> KA MS/PK I-4/12 2388 ex 1912

<sup>13</sup> MMKM (Magyar Műszaki és Közlekedési Múzeum) Mladiáta-collection "35 cm Granate"

<sup>14</sup> The main reason behind this decision was the better protection: the simpler system needed a smaller barbette diameter (in the case of a triple turret 10.3 m instead of 11.2 m), which reduced the badly protected (75 mm horizontal plate) area between the barbette and the armoured turret shield. KA MS/PK

<sup>15</sup> MMKM Mladiáta-collection "24 500 T Schlachtschiff"

<sup>16</sup> MMKM Mladiáta-collection carton 13 "24 500 T Schlachtschiff"

<sup>17</sup> KA MS/PK I-4/11 1247 ex 1913



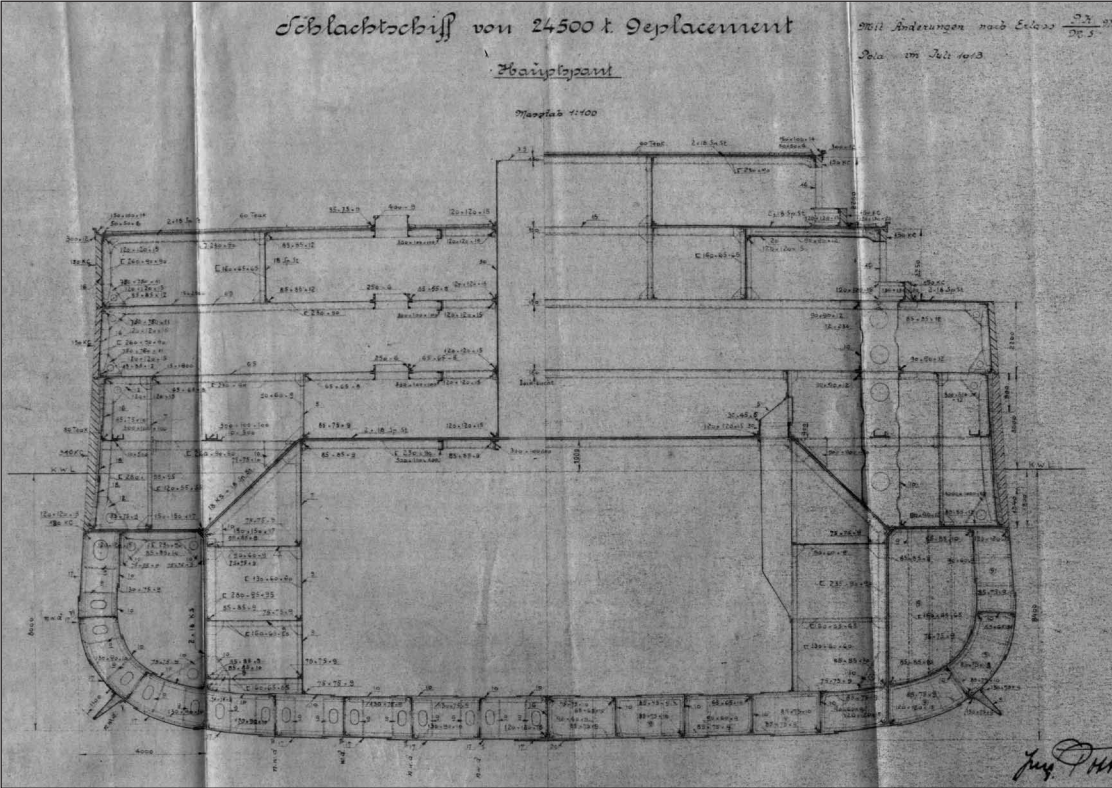


Figure 4

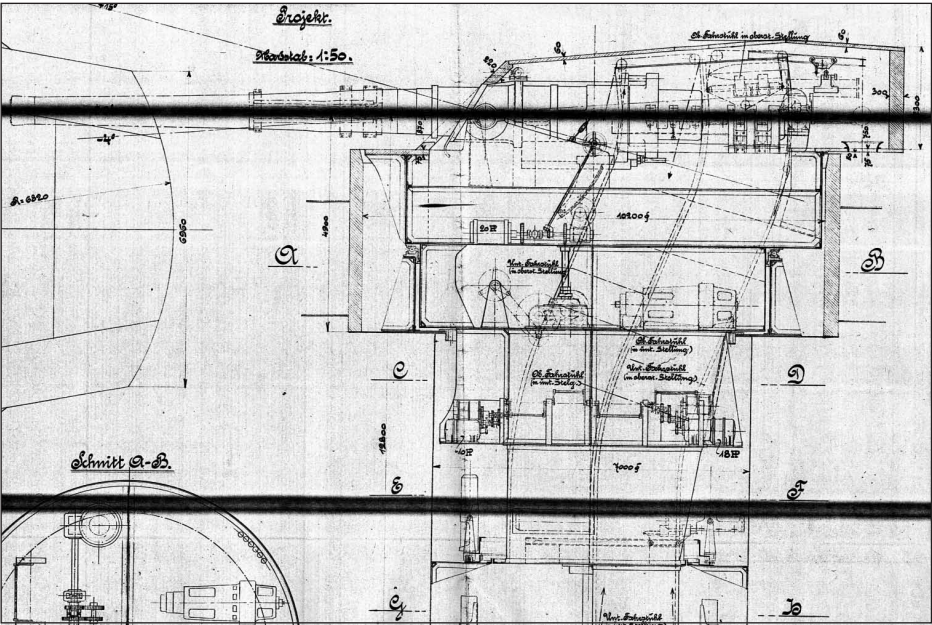


Figure 5



	<b>NTC 24 500 ton</b>	<b>Danubius 24 650 ton</b>
<b>Dimensions in m</b>	173.2×28.5×8.4	<b>167×29.2×8.3</b>
<b>Machinery</b>	15 Yarrow boilers 2 sets of Parsons-turbines	<b>15 Babcock-Wilcox boilers 2 sets of AEG-turbines</b>
<b>Power/speed in Hp/kts</b>	31 000/21	<b>32 000/21</b>
<b>Range in nm</b>	6000	<b>6000</b>
<b>Armour in mm</b>	300 belt 36 deck 340-80 turret 300 conning tower	<b>300 belt 36-48-63 deck ? turret 300 conning tower</b>
<b>Armament</b>	<b>10×35 cm L/45 18×15 cm L/50 20-22×9 cm L/45 6×53.3 torpedo launcher</b>	<b>10×35 cm L/45 18×15 cm L/50 ?×9 cm L/45 6×53.3 cm torpedo launcher</b>

The Danubius's ship was shorter and beamier, a more stable gun platform, than the NTC design. In her proportions she resembled to the contemporary German battleships. Her torpedo-protection system was very interesting, instead of a single torpedo bulkhead consisted of a second, internal vertical double-bottom, with 45 mm (22.5+22.5) and 15 mm plating. The distance between the two plating was 700 mm.<sup>18</sup> Unfortunately, we don't know the distance between the ship's side and the 45 mm plating. The torpedo protection system of the NTC 24 500 ton design was similar to the former 25 200 ton design: a 36 mm (18+18) torpedo bulkhead 4 m from the ships side, the space between the inner plating of the vertical double bottom and the torpedo bulkhead was filled with the reserve coal. The torpedo bulkheads were strengthened by armoured chambers before the coaling doors. On the basis of theoretical calculations this system would have provided four times greater resistance against underwater explosions than the system of the *Tegetthoff*-class.<sup>19</sup>

On 19<sup>th</sup> April a board headed by the Commander of the Navy Vice-Admiral (from 1<sup>st</sup> May full Admiral) Anton Haus decided for the final turret arrangement: the twins superimposed over triples. The board on the same day rejected all the designs of the private owned yards, giving solely in Pitzinger's and the NTC's hand the design of the future battleship.<sup>20</sup> This time Franz Pitzinger, who favoured his own design, won the battle over the private owned yards and his predecessor, Siegfried Popper, which lost in the case of the *Tegetthoff*-class.

<sup>18</sup> KA MS/PK I-4/11 1247 ex 1913

<sup>19</sup> MMKM Mladiáta-collection carton 13 "24 500 T Schlachtschiff"

<sup>20</sup> KA MS/PK I-4/11 1766 ex 1913

1247/13  
1913  
B.O.

MOTIVENBERICHT : 1247  
P. K.

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1.) HAUPTDIMENSIONEN :

Länge über alles unter K W L : ..... 167·0 m ,  
 Breite im )O( auf K W L : ..... 29·2 m ,  
 Tiefgang bei halben Vorräten : ..... 8·27m ,  
 Freibordhöhe im )O( bei  $\frac{1}{2}$  Vorräten : ..... 7·03m ,  
 Displacement auf K W L : ..... 24650 t ,  
 Displacement bei  $\frac{1}{2}$  Vorräten : ..... 24540 t .-

FEUERHÖHE der TURMGESCHÜTZE :

Turm I : ..... 9·6m,  
 Turm II : ..... 12·2m,  
 Turm III : ..... 9·5m,  
 Turm IV : ..... 6·9m.-

FEUERHÖHE der 15 cm GESCHÜTZE im )O( : ..... 5·90m,  
 der 9 cm Geschütze im.)O(: ..... 9·00m,  
 der 9 cm Geschütze auf dem Turm II : ..... 14·8m ,  
 der 9 cm Geschütze auf dem Turm III : ..... 12·1m .-

Maximal - Metacenterhöhe : ..... 1·79m.-

2.) SCHIFFSKÖRPERKONSTRUKTION :

Die angeschlossene kurz gefasste Spezifikation gibt eine Übersicht über die beabsichtigte Dimensionierung der Bauteile .-

3.) PANZERDECK :

Dasselbe ist mittschiffs auf eine Höhe von 2·6 m über die K. W. L. gehoben .-

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■ Figure 6

On 23<sup>rd</sup> April 1913 the Command of the Navy ordered the NTC to rework the January 1913 design: after some weight saving modifications it had to thicken the armour of the belt, the barbettes and the conning tower. In addition, it had to completely redesign the electric system of the ship. The matter was so secret, that Pitzinger personally had to hand the new designs to Haus.<sup>21</sup>

In the same order the Navy asked the NTC to work out preliminary designs for two enlarged battleships: a ship of 30 000 ton with twelve 35 cm guns in four triple turrets, and a 32 000 ton ship with thirteen 35 cm guns in three triple and two twin turrets (similar to the Italian *Conte di Cavour*-class). These ships had to attain a speed of 23 knots, and their armour had to be thicker than the 24 500 ton ship.<sup>22</sup> Because in October 1913 it was decided that the Navy build 24 500 ton battleships, on 20<sup>th</sup> October Haus asked Pitzinger to make only roughly outlined designs.<sup>23</sup> The NTC presented the two designs, with 1:200 scale drawings in January 1914, but the designs soon were stamped "ad acta".<sup>24</sup>

On 4<sup>th</sup> August 1913 Pitzinger presented the modified 24 500 ton design to Haus. The armour of the casemates was reduced from 180 mm to 150 mm, and the armour of the bow from 150 to 140 mm. Of the weight saved the armour of the conning tower and the barbettes was increased from 300 to 320 mm and the belt was increased to 310 mm. At the request of the Navy, the dotation of ammunition for each 35 cm gun was increased from 76 to 100. For this reason it had to redesign the ammunition rooms and the lower part of the gun turrets, and it had to abandon the projected mine room.<sup>25</sup> In October 1913 the Navy decided for a new arrangement of the 9 cm guns: to increase the bow fire, casemates with two guns were installed under the forecastle deck in the crew compartment on each side of the bow.<sup>26</sup>

After the authorization of the new extraordinary credit for the Navy by the Common Council of the Ministers (Gemeinsame Ministerrat) in October 1913, the Navy started negotiations with the representatives of the three shipyards on the technical and financial questions of the building. On the 1<sup>st</sup> December meeting of representatives of the Navy and of the STT, was a short but bitter fight of words between Pitzinger and the director of the yard, who represented the opinion of Popper (in other words: a virtual polemic between Pitzinger and

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<sup>21</sup> KA MS/PK I-4/11 500 ex 1913

<sup>22</sup> KA MS/PK I-4/11 500 ex 1913

<sup>23</sup> KA MS/PK I-4/11 500 ad 2 ex 1913

<sup>24</sup> KA MS/PK I-4/9 493 ex 1914. Main technical data: 29 600 ton design: 195.2×29 m, 45 000 Hp/23 kn, 320 mm belt, 12×35 cm, 18×15 cm, 18×9 cm, 6×53 cm TL. 32 000 ton design: 197.7×29.5 m, 50 000 Hp/23 kn, 320 mm belt, 13×35 cm, 18×15 cm, 18×9 cm, 6×53 cm TL. Special thanks to Mr. Andrew Wilkie for the drawings of these ships.

<sup>25</sup> KA MS/PK I-4/11 3724 ex 1913

<sup>26</sup> KA MS/PK I-4/11 5256 ex 1913

Popper) over the torpedo protection. In essence Pitzinger accused Popper of designing a flawed torpedo protection system for the *Tegetthoff*-class.<sup>27</sup> Beside the calculation of the price of the new battleships, it started the workout of the detailed designs. The last significant modification of the design occurred on 15<sup>th</sup> April 1914: the upper 15 cm casemate (around the conning tower) with its four guns was abandoned, because its foundation was too weak, otherwise the fore triple turret in turned state blocked the firing of these guns. The superstructure had to redesign too, because the rangefinder on the top of the conning tower was changed from a 4 m to a 5 m one.<sup>28</sup>

When the delegations voted for the extraordinary credit in May 1914, the final design was ready for approve, only one great test was still to come: the underwater explosion test on a real size midship section.

### POLITICAL AND FINANCIAL BACKGROUND

The struggle of the Navy for securing the money for a new battleship class started in March 1912. Admiral Rudolf von Montecuccoli the Commander of the Navy presented a very ambitious (in fact, the most ambitious in the history of the Navy) programme in March 1912: he asked a grant of 464 million Crowns. This sum would have allowed the construction of four 24 500 ton battleships, five cruisers, a dozen destroyers, six submarines, three coal transport ships, a new floating dock of 40 000 ton, four Danube monitors and four Danube patrol boats. The more realistic Emperor, Francis Joseph advised him to present his programme in a more favourable time.<sup>29</sup>

On the 9<sup>th</sup> July meeting of the Common Council of the Ministers Montecuccoli asked only 24 million Crowns for starting the construction of one new battleship. By the Hungarian members, Prime Minister László Lukács and Finance Minister János Teleszky even this modest sum was rejected. On 3<sup>rd</sup> October Montecuccoli asked 170 million Crowns for the construction of two 24 000 – 25 000 ton battleships. On 8<sup>th</sup> October Lukács and Teleszky told him that they would assent to the costs of the new class only if the precedent one was paid, but they promised to bring forward the payment from 1916 to 1914.<sup>30</sup>

In February 1913 the old and compromised Montecuccoli was succeeded by Anton Haus. In March 1913 Archduke Francis Ferdinand who wanted to repeat the method to start the construction on the formal own risk of the shipyard STT, like in the case of the *Tegetthoff*-class, urged Haus to order the new

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<sup>27</sup> KA MS/PK I-4/11 6078 ex 1913

<sup>28</sup> KA MS/II. GG (II. Geschäftsgruppe) 47 C/6

<sup>29</sup> Halpern op. cit. p. 98

<sup>30</sup> Halpern op. cit. p. 100



dreadnoughts secretly, not informing the Austrian and Hungarian politicians.<sup>31</sup> Despite the great pressure from the Archduke, Haus did not want to evade the politicians, and in April started negotiations with Austrian and Hungarian ministers on this method of construction.

On 18<sup>th</sup> April 1913 the STT, the Škoda and the Witkowitz Ironworks (which delivered the armour to the Navy) offered to the Navy in a letter to start the construction of a battleship on designs provided by the Navy. On 20<sup>th</sup> April in Vienna Haus gave an exemplar of the abovementioned letter to Lukács, who thanked the correctness of Haus. Lukács told Haus that he had known of it from a month, and the members of his cabinet had been anxious of this matter. Haus felt, that he was justified, and the secret-mongering pressed by the Heir of the Throne was a blunder. The common ministers, Imperial War Minister Krobatin, Imperial Foreign Minister Berchtold and Imperial Finance Minister Biliński supported the plan, but the Austrian Prime Minister Stürgkh and Finance Minister Zaleski were not too enthusiastic.<sup>32</sup>

On 25<sup>th</sup> April Teleszky refused the plan. On 1<sup>st</sup> May even the Emperor tried to convince Teleszky in vain. After the audience Haus negotiated with Teleszky, who only repeated his former arguments. On 7<sup>th</sup> May Lukács sent a letter to Haus, in which explained, that the political and economical situation in Hungary not rendered possible to support the construction on formal own risk. He added that all kind of ordinance to the shipyard from the Navy he should qualify as a formal order.<sup>33</sup>

On the 14<sup>th</sup> May meeting of the Common Council of the Ministers Haus made a last effort to have accepted his plan. The common and the Austrian ministers supported him, but the two Hungarian ministers refused it again. Beside the economical arguments Lukács enumerated political ones. He told, that even in his own Party (Nemzeti Munkapárt<sup>34</sup>) shouldn't be able to defend the construction on formal own risk. Teleszky repeated his promise to bring forward the new credit from 1915 to 1914. Haus asked Lukács, what should be the consequence if the Navy tried to start the construction. Lukács replied: he and Teleszky should resign.<sup>35</sup>

On the 19<sup>th</sup> May audience the Emperor advised Haus not to provoke the Hungarian government. Francis Joseph agreed with Haus not to evade the

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<sup>31</sup> KA MS/PK I-4/11 1096 ex 1913

<sup>32</sup> KA MS/PK I-4/11 2295 ex 1913

<sup>33</sup> KA MS/PK I-4/11 2295 ex 1913

<sup>34</sup> The Szabadelvű Párt (Liberal Party) was the governing party in Hungary from 1875 to 1904. After the opposition parties won the election of 1904, Count István Tisza organised on the ruins of the Liberal Party a new party, the Nemzeti Munkapárt (National Party of Work), which was the governing party between 1911 and 1918.

<sup>35</sup> KA MS/PK I-4/11 2295 ex 1913

politicians and not to compromise the Navy.<sup>36</sup> The matter of the new class of battleship came to a standstill, which lasted to October 1913.

Haus, as Commander of the Navy had many troubles with Archduke Francis Ferdinand, who was the chief protector of the Navy but who interfered always in the affairs of the Navy in a narrow-minded manner.<sup>37</sup> The greatest friction between them was caused by the question of the battleship construction. After the fiasco on the meeting of the Common Council of Ministers Haus, who in these times played with the idea of resignation,<sup>38</sup> wrote a long letter to the Heir of the Throne, in which he explained away his report. He described in all details the events of April and May, and pointed out that the delay of the construction in fact should be only one month, instead of six or seven months, because the time needed to work out the detailed designs for the new battleship.<sup>39</sup>

The moment of victory for Haus came on the 3<sup>rd</sup> October meeting of Common Council of Ministers. All the ministers, including the new Hungarian Prime Minister, Count István Tisza and Teleszky approved the new extraordinary credit of 426.8 million Crowns which included the costs of a new battleship class of four units. The credit should be lent from the 1914/1915 fiscal year to the 1918/1919 fiscal year.

The 426,836,000 Crowns extraordinary credit provided the costs of four 24 500 ton battleship (*Schlachtschiff VIII-XI*) 81.5 million Crowns each unit, three 4800 ton cruisers (*Kreuzer K, L, M*), six 800 ton destroyers, two 520 ton monitors and a food transport ship. The full cost of these ships was 400 million Crowns. The greatest part of the remaining 27 millions was intended for land constructions in the Arsenal, 4 millions for Naval Flying and 1.1 million for the Radio Station Pula.<sup>40</sup>

For the private owned shipyards the question of the design was only a question of prestige, from the business point of view the real important question was that: who should be built these ships? Hearing the news of the credit, the representatives of the three shipyards hurried to Vienna. In the second half of October the Navy sent the designs to the STT, the CNT and the Danubius for price calculation.<sup>41</sup> The agents of the CNT were the most aggressive, which filled with fear the Hungarians, and they were afraid of to be left out of battleship construction. But the fear proved to be baseless: the Navy knew that in the delicate political system of the Dualism the price of the Hungarian votes

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<sup>36</sup> KA MS/PK I-4/11 2295 ex 1913

<sup>37</sup> See Halpern op. cit. p. 85-90 and Balla op. cit. P. 89-92

<sup>38</sup> He was seriously ill and bored.

<sup>39</sup> KA MS/PK I-4/11 2295 ex 1913

<sup>40</sup> KA MS/PK XV-7/7 1035 ex 1914

<sup>41</sup> KA MS/PK I-4/11 2536, 3724 ex 1913

for the credit was the order of battleships in the Danubius, despite the many problems with the construction of the *Szent István*. Hungarian Finance Minister Teleszky in 1913 clearly let the Navy know what the Hungarians expected in exchange of voting for the credit.<sup>42</sup>

Before the voting for the credit in May 1914, in February-March the Navy made a study on the possible sharing of the industrial orders of the new programme between Austria and Hungary, respective to the quota (Austria 63.6 %, Hungary 36.4 %). According to that study two battleships, one cruiser and six destroyers and two monitors, or two battleships and two monitors should have been ordered from the Hungarian industry. The Navy liked neither variant, in the first one was too much the number of the ships ordered in Hungarian yards, in the second one was too much the volume of the orders from the Hungarian iron industry.<sup>43</sup>

In a draft of an agreement made in April 1914, 283.13 million Crowns went to Austria and 135.71 million Crowns (two battleships, six destroyers and two monitors) went to Hungary.<sup>44</sup> This meant only 32.4 % instead of 36.4 %. Because a written formal agreement is missing from the files of the Kriegsarchiv, we don't know what the Navy exactly presented to the Hungarian negotiating party led by Teleszky. It must have been satisfactory for the Hungarians, because on 20<sup>th</sup> May the Hungarian delegation without any debate voted for the credit. On 28<sup>th</sup> May the Austrian delegation voted for the credit too, but only after a brief debate.

### THE UNDERWATER EXPLOSION TEST

It is matter of common knowledge that the deficiencies of torpedo protection of the *Tegetthoff*-class dreadnoughts moved the Austro-Hungarian Navy to carry out expensive underwater test, following the German example.<sup>45</sup> To evaluate the layout of underwater protection (torpedo bulkhead, armour deck) a 1:1 middle section (*Sprengobjekt*) was constructed. All test reports were, however, withdrawn from the Kriegsarchiv Vienna in 1919/1920 by an allied fact finding team of unknown nationality, consequently the effects of test remained unknown up to this date.<sup>46</sup>

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<sup>42</sup> KA MS/PK XI-4/9 582 ex 1913

<sup>43</sup> KA MS/PK XV-7/7 1035 ex 1914

<sup>44</sup> KA MS/PK XV-7/7 1035 ex 1914

<sup>45</sup> The Imperial German Navy was the first which executed underwater explosion tests from 1906 on real size sections.

<sup>46</sup> In the estate of János Mladiáta, a former member of the NTC, I have found the hitherto missing documentations of the test. MMKM Mladiáta-collection carton 25

The experiment with the scale 1:1 section of the projected 24 500 ton battleship was ordered by the Navy on 9<sup>th</sup> September 1913. The NTC completed the plans for the 450 ton displacement *Sprengobjekt* by November 1913. The 7.87 m long, 8.24 wide and 11.22 m high *Sprengobjekt* represented a six frame intersects long boiler room section of the 24 500 ton battleship. The empty weight of the *Sprengobjekt* was 133 ton, 61 ton armour plates represented the belt, 51 ton plates were used on the other side as counterbalance. The space between the torpedo bulkhead and the vertical double bottom contained 64 ton coal (briquette), 87 ton additional ballast and 54 ton water in the double bottom and vertical double bottom cells trimmed the *Sprengobjekt*.<sup>47</sup>

The explosion was originally planned by a sea mine, simply bolted to the hull 4.2 m below the waterline, but the 8<sup>th</sup> March 1914 order of the Navy decided for a 45 cm torpedo warhead, filled with 110 kg ammonal. The torpedo warhead could be lowered in a cage on two vertical rails by a davit.<sup>48</sup> The *Sprengobjekt* was built in the Pula Arsenal in the late spring of 1914.

On the order No. 157 of the Harbour Admiralty of the Pula Arsenal of 6<sup>th</sup> June, the experiment was executed at 2:30 pm on 10<sup>th</sup> June 1914. In the morning of 10<sup>th</sup> June the *Sprengobject* was towed from the Arsenal to the bay of Valmaggione, where it was moored 3.1 km from the pier from which the committee observed and filmed the experiment. At 2:30 pm the warhead was ignited by an electric cable. The splash caused by the explosion was 70 m high. The *Sprengobjekt* sank in 28 minutes. On the next day the wreck lying on the seabed was examined by a diver. On 15<sup>th</sup> June the wreck was salvaged by the 240 ton floating crane of the Arsenal and was carried to the Dock No 22 for examination.<sup>49</sup> It's more than probable that the experienced engineers of the NTC and the Arsenal at the first glance saw that the experiment was successful, and the protection system worked well, and orally gave an account of the result.

The committee pointed in its 3<sup>rd</sup> July official report out that the experiment was a success, as the torpedo bulkhead and the armoured deck remained watertight.<sup>50</sup> The explosion caused only small dents (max 80 mm) in the

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<sup>47</sup> MMKM Mladiáta-collection carton 25 "Projekt enies Sprengobjektes"

<sup>48</sup> MMKM Mladiáta-collection carton 25 "Projekt enies Sprengobjektes"

<sup>49</sup> MMKM Mladiáta-collection carton 25 "Kommissionprotokoll"

<sup>50</sup> The lower layer of the armour deck was tore away by the explosion, but the upper layer remained watertight. This throws light upon the other deficiency of the underwater protection system of the *Tegetthoff*-class. The edge of the armour deck, in the joint of the hull and of the deck were constructed of only one single 18 mm layer, the upper 30 mm layer ended more then 1 m from the outer plating of the hull. This thin 18 mm layer could not resist to the explosion. In the case of the *Szent István* and the *Viribus Unitis* the explosions tore away the 18mm plates of the armour deck and water flowed in the coal bunkers situated above the armour deck. See also Dr. Balogh Tamás: Jelentés a "Szent István" csatahajónál 2008. szeptember 30. és október 5. között lefolyt expedíció eredményeiről. 2008.



torpedo bulkhead. The brief summary stressed: "On the basis of the experiment it can be stated that a ship constructed this way would not be endangered by a 110 kg 45 cm torpedo warhead and the 2 degree heeling can easily be compensated."<sup>51</sup>

### THE FINAL DESIGN

After the successful underwater explosion test, ironically on the same day of the Sarajevo murder the NTC presented to the Navy the final version of the 24 500 tons or "Improved Tegetthoff-class" battleship. The design was approved by the Navy on 1<sup>st</sup> July.<sup>52</sup>

The final design in many respects resembled to the very first variant of January 1913: the hull, the machinery and the torpedo protection system were the same, as the main armament. From the first steps, caused by the strict weight limit the aft conning tower and the mainmast were omitted, and the small control towers of the 15 cm secondary artillery were integrated in the casemates. The most important visible differences were the following: the abandoned upper 15 cm casemate, the rearranged lower 15 cm casemates (bow fire reduced from 10 to 8 guns), the new 9 cm bow casemates and a small mainmast to support the radio antennas. Of the weight saved by the reduction of the casemate and bow armour and by the omitted upper casemate it was thickened the armour of the belt, the conning tower, the barbettes, the turret sides and roofs, and the splinter bulkheads in the casemates.

The "Improved Tegetthoffs" despite their limitations would have been a great improvement on the preceding class in size, firepower, protection, stability and seagoing performance. The designers made every effort to correct the deficiencies of the *Tegetthoff* design. The centre of gravity was 1.289 m over the waterline instead of 1.789 m, and the metacentric height was 1.886 m instead of 1.101 m, which would have provided much better stability to the new class. To reduce the risk of deformation of the after part of the hull in a dry dock, the upward part of the keel at the stern was 17 m instead of 27 m. The raised forecastle deck would have provided better seagoing performance and more accommodation space for the crew. As we seen, the torpedo protection system was much better than of the preceding class. The other great deficiency of the *Tegetthoff*-class was the weak construction of their watertight bulkheads, which were further weakened by watertight doors. Of the 21 stronger watertight bulkheads of the "Improved Tegetthoff" only one was cut by a watertight door.<sup>53</sup>

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<sup>51</sup> MMKM Mladiáta-collection carton 25 "Kommissionprotokoll"

<sup>52</sup> MMKM Mladiáta-collection carton 13 "24 500 T Schlachtschiff"

<sup>53</sup> MMKM Mladiáta-collection carton 13 "24 500 T Schlachtschiff"

In international comparison the fighting value of these battleships would have been approximately equal to the British *King George V* and *Iron Duke* (23 500 and 25 000 tons, 10×34.3 cm) classes of 1911-1912, but the Austro-Hungarian ships would have had better protection. On the Mediterranean they would have been fine ships, clearly better than the French 34 cm *Bretagne*-class of 1912. Their greatest disadvantage was the fact that they wouldn't have been in the same class with the planned new Italian battleships of the *Francesco Caracciolo*-class (31 400 tons, 8×38.1 cm, 28 kts). In November 1913 the Austrian Press criticized the Navy for building "dreadnoughts" while the other powers (i. e. Italy) were building "super-dreadnoughts". Haus felt that he had to defend his battleships riposting that the Navy hadn't inexhaustible funds at its disposal.<sup>54</sup>

Soon after the outbreak of the World War One all preparatory works were stopped. In the Kriegsarchiv there's no sign of an official contract with any of the two shipyards. Only the ten plus one spare 35 cm guns were ordered from the Škoda.<sup>55</sup> In December 1914 the full program was cancelled unofficially by the Navy,<sup>56</sup> the official cancellation occurred on the 3<sup>rd</sup> February 1915 meeting of the Common Council of Ministers.

Finally, a few words on the ship's names: it's a popular belief that the first 24 500 ton battleship intended to build in the Danubius, the No IX, was to be named Hunyadi.<sup>57</sup> Knowing the name-giving procedure of the Austro-Hungarian Navy, it seems a mere speculation. The name for a new ship was chosen little before her launch, and in the case of a battleship, by the Heir of the Throne or by the Emperor. But in the estimated time of the launch of the first 24 500 ton Danubius battleship the two protagonists, Francis Ferdinand and Francis Joseph were already dead.

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<sup>54</sup> Halpern op. cit. p. 118

<sup>55</sup> See Erwin F. Sieche: The 35 cm guns of the "Improved Tegetthoff-class" Battleships

<sup>56</sup> KA MS/PK XV-7/7 4935 ex 1914

<sup>57</sup> Hunyadi was the family name of governor János Hunyadi, who defeated the Turks at Belgrad in 1456. His son, Mátyás as Matthias Corvinus was the most famous and popular king of Hungary (1458-1490).

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## APPENDIX

### Technical Data of the “Improved Tegetthoff-Class”

Length on waterline: 172 m

Overall length: 173.2 m

Beam: 28.5 m

Draught: 8.4 m

#### Displacements

With ammunition, without fuel and provisions: 23 372 metric tons

Normal or trial: 24 517 metric tons

Full load, but without oil: 25 425 metric tons

Full load: 26 460 metric tons

#### Weights

Hull: 7093.8 tons (28.9 %)

Equipment and provisions: 1549.3 (6.3 %)

Armament including turret shields: 3344.1 tons (13.7 %)

Ammunition: 1131.1 tons (4.7 %)

Machinery: 1830 tons (7.5 %)

Electric power plant and equipment: 335.5 tons (1.4 %)

Vertical armour: 6316.9 tons (25 %)

Deck and torpedo protection: 1814.3 tons (7.5 %)

Fuel: 970 tons (4 %)

Total including 132 tons margin: 24 517 metric tons

#### Machinery

9 coal fired Yarrow watertube boilers, 3200 m<sup>2</sup> heat transfer surface area

6 oil fired Yarrow watertube boilers, 2600 m<sup>2</sup> heat transfer surface area

(Danubius: 9+6 Babcock-Wilcox boilers)

Boilers in 3 boiler rooms, two funnels

2 sets of Parsons-turbines (Danubius: AEG-turbines) on four shafts

Turbines divided in three watertight spaces, main condenser in the fourth

Designed power: 31 000 SHP

Estimated power: 32 000 – 34 000 SHP<sup>58</sup>

Designed speed: 21 knots

Estimated speed: 21.42 – 21.58 knots<sup>59</sup>

Range: 6000 nautical miles

Fuel: coal 1425 tons, oil 1035 tons

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<sup>58</sup> On the basis of power/machinery weight ratio attained by the *Tegetthoff*-class on trials

<sup>59</sup> On the basis of theoretical calculations, the first by Taylor, the second by Froude method.  
MMKM Mladiáta-collection carton 13 “24 500 T Schlachtschiff”

## Electric power

6×250 KW turbine-driven DC dynamos  
 2×150 KW turbine-driven DC dynamos  
 2×150 KW motor-driven DC dynamos  
 2× AC generators

## Armour<sup>60</sup>

Belt: 310 mm KC, lower part tapered to 180 mm KC  
 Upper belt: 150 mm KC  
 Casemate: 150 mm KC  
 Bow/stern: 140-130-110/200 mm KC  
 Fore and aft armoured bulkheads: 150 mm KC  
 Conning tower upper/lower/roof: 320/280/110 mm KC  
 Upper part of the 15 cm control towers: 180 mm KC  
 Barbettes fore/aft: 320-280-110/320-110 mm KC  
 Funnels up to 2 m over upper deck: 30 mm K  
 Upper deck/armour deck/torpedo bulkhead: 36/36/36 mm SP  
 Gun turrets face/side/inclined part/roof: 340/300-250/230 mm KC 80 mm SP

## Armament

10×35 cm L/45 Škoda guns with sliding wedge breech (Krupp-system)  
 Weight of fore gun turrets triple/twin: 849.2/613 tons  
 Weight of aft gun turrets triple/twin: 843/609 tons  
 Weight of barrel with breech: 74 tons  
 Elevation: -4°/+16° or 20° (?)  
 Elevation/train rate: 3° per sec/3° per sec  
 Weight of a load (projectile + case + propellant): 905 kg<sup>61</sup>  
 Dotation for each guns: normal 76 maximal 88 + 12 practice  
 Projectile's weight: 635 kg  
 Muzzle velocity: 820 m/s  
 Range: over 25 000 m (at 20°)  
 Armour piercing capacity (hypothetic): 505 mm at 8000 m

<sup>60</sup> KC means Krupp-cementit, K means chromium-nickel steel, SP means "Spezialstahl" (special steel).

<sup>61</sup> The charge of the 35 cm gun, unlike the Škoda 30,5 cm gun, was similar to the German heavy gun charge. It was a two part charge, which consisted of a normal, main case (220 kg) and a fore case (50 kg), the latter was made of thin 0.5 mm brass, which burned in the chamber during firing. The two part charge was easier to handle and was cheaper. The designed weight of a 34.5 cm gun was 73 tons the projectile was 650 kg, the main case 140 kg and the fore case 60 kg.



14×15 cm L/50 Škoda (Danubius: Magyar Ágyúgyár<sup>62</sup>) guns with sliding wedge breech

Weight of a gun with shield: 19.8 tons

Elevation: -6°/+15°

Weight of a load: 80 kg

Dotation for each gun: 225

Projectile's weight: 45.5 kg

Muzzle velocity: 880 m/s

Range: 15 000 m

20×9 cm (8.8 cm) L/45 Škoda (Danubius: Magyar Ágyúgyár) guns with sliding wedge breech, 12 of them for AA purposes

Weight of a gun with mounting: 2270 kg

Weight of a load: 18.5 kg

Dotation for each gun: 400 (AA 550)

Projectile's weight: 10.5 kg

Muzzle velocity: 800 m/s

6×53.3 cm Whitehead underwater torpedo launchers (1 bow, 1 stern, 2-2 broadsides)

Dotation: 4-4 for fore & aft launchers, 6-6 for broadside launchers

### Fire control

1×5 m rangefinder on the top of the conning tower

4×5 m rangefinders in the gun turrets

2× rangefinders of unknown base length in the 15 cm control towers

12×110 cm searchlights

The fire control system planned for these ships is unknown. The main fire control position is in the conning tower, as on the German battleships. There's no heavy tripod mast, only a light pole mast with a crow's nest. In 1914 Navy Commander Haus planned to improve the Austro-Hungarian fire control which was obsolete and the Navy ordered from England two of the Pollen's Argo clocks. These clocks were never delivered. Maybe Haus intended the Pollen-system for the future battleships too.

### Boats (2×13 tons boats crane)

1×13 tons steam barge

1×9 tons and 1×5 tons motor barges

2×4.7 tons sailing barges

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<sup>62</sup> The Magyar Ágyúgyár (Hungarian Gun Factory) was established in Győr in 1913. For the two battleships which were planned to built in the Danubius, the Magyar Ágyúgyár would have been manufactured the 15 and 9 cm guns. KA MS/PK XV-7/7 1035 ex 1914

- 4× cutters
- 1× rescue cutter
- 2× jolly boats
- 2× motor-gigs
- 4× small jolly boats

## Complement

38 officers, 16 NCO, 1106 men

### Sažetak

*U veljači i ožujku 1911. mađarska i austrijska delegacija izglasale su izvanredno kreditiranje u iznosu od 312 milijuna kruna, kojim je omogućena gradnja četiriju bojnih brodova (drednota) klase Tegetthoff. U prosincu iste godine Mornarica je započela s planiranjem radova na sljedećoj klasi drednot. U skladu s međunarodnim trendovima, brodovi budućnosti trebali su biti veći, bolje zaštićeni i imati teže naoružanje, što je značilo veći kalibar. Brodski tehnički odbor izradio je između prosinca 1911. i ožujka 1912. niz pretprojekata brodova istisnine 23.000 – 25.000 tona, s 8–10 topova kalibra 34,5 li 35,5 cm. Mornarici je bio draži veći kalibar – 35,5 cm. Odbor je u svibnju 1912. izradio novi niz projekata brodova istisnine 25.200 tona.*

*Mornarica je 7. srpnja 1912. zatražila da brodogradilište Ganz-Danubius u Rijeci izradi vlastiti nacrt bojnog broda istisnine 24.500 tona. Tonaža je ograničena jer je brod trebao stati uz najveći plutajući dok mornarice (dok br. 22). Početkom 1913. brodogradilište Ganz-Danubius predstavilo je svoj projekt. Na temelju specifikacija od 7. srpnja, Odbor je predstavio vlastiti projekt broda istisnine 24.500 t, koji je poslije postao osnovom za konačni projekt. Brod koji je projektirao Ganz-Danubius bio je kraći i širi, dakle stabilniji kao topnička platforma, od broda koji je projektirao Odbor. Najveći mu je nedostatak bio nezadovoljavajući sustav zaštite od torpeda.*

*Mornarica se odlučila za projekt Odbora i u travnju 1913. utvrdila postavu glavne bitnice: dvije trocijevne topovske kule, po jedna na pramcu i na krmi, te po jedna dvocijevna kula iznad njih. Nakon uspješnog testiranja sustava zaštite od torpeda na presjeku 1:1 (Sprengobjekt) 10. lipnja 1914., konačni je projekt mornarica odobrila 1. srpnja 1914. godine.*

*Nakon dugog niza političkih rasprava, u svibnju 1914. obje su delegacije izglasale nov izvanredni kredit od 426 milijuna kruna, koji je obuhvaćao troškove četiri nova bojna broda. Kao i 1911., mornarica je u travnju 1914. sklopila sporazum s mađarskom vladom o raspodjeli narudžaba brodova. Na temelju arhivskih materijala može se ustvrditi da je za dva od četiri bojna broda gradnja bila planirana u Rijeci, ali kako su postojali alternativni planovi, a u ratnom arhivu (Kriegsarchiv) u Beču nema pisanoga formalnog sporazuma, to je samo vjerojatnost, a ne činjenica.*

**Ključne riječi:** Ganz-Danubius Rijeka, dva planirana bojna broda, klasa drednot