

HARALD PÖCHER¹**The Armament Industry of Hungary between 1867 and 1945:
Always to the Limits of What is Possible****Magyarország hadiipara 1867 és 1945 között: lehetőségek és
korlátok között****Abstract**

There was no significant armament industry in Hungary before the compromise of 1867. After the compromise, Hungary made great efforts to establish weapon factories. This essay gives an overview of the armament industry of Hungary between the years 1867 and 1945. As the essay shows, during the days of the Austro-Hungarian empire, the Hungarian armament industry offered a wide range of products. After the First World War until the end of the Second World War, the achievements of the Hungarian armament industry show us that it is also possible for a smaller state to operate an efficient armament industry, but only to the limits of what is possible.

Keywords: armament industry in Hungary; Hungarian aircraft factory – Ungarische Flugzeugwerke, Hungarian Lloyd Aircraft and Motor Works Corporation, Hungarian General Machine Factory Corporation

Absztrakt

Magyarországon az 1867-es kiegyezés előtt nem volt jelentős hadiipar. Azt követően Magyarország nagy erőfeszítéseket tett a fegyvergyárak létrehozására. A tanulmány áttekintést ad a magyar fegyveriparról 1867 és 1945 között. A Szerző szerint az Osztrák–Magyar Monarchia időszakában a magyar fegyveripar széles termékválasztékot kínált. Az első világháború utántól a második világháború végéig a magyar fegyverzetipar eredményei azt mutatják, hogy egy kisebb állam is képes hatékony fegyveripar működtetésére, de csak bizonyos határok között.

Kulcsszavak: magyar fegyvergyártás, hadiipar, Magyar Repülőgépgyár RT, Magyar Lloyd Repülőgép és Motorgyár R. T; Magyar Általános Gépgyár

¹ Osztrák Védelmi Minisztérium (Bundesministerium für Landesverteidigung), dandártábornok, közgazdász, főosztályvezető, E-mail: harald.poecher@bmlv.gv.at

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

PRELIMINARY REMARKS

For the past 15 years, it has been my honor to count Vice-Rector Major General Prof. Dr. József Padányi among my friends. Within the years of our friendship, we were able to complete many research projects, and he taught me to understand Hungarian history and the achievements of Hungarian military scholars. As an outcome of this fruitful scientific exchange of ideas, I have written many essays in German about the military history of Hungary and published them in Austrian scholarly journals. József, I hope you will enjoy the following short essay about the impressive achievements of the Hungarian armament industry between 1867 and 1945, which I wrote especially for this commemorative publication. I thank you for your friendship and for your kindness in giving me the opportunity to complete my habilitation at the former Zrínyi Miklós Nemzetvédelmi Egyetem.

1. INTRODUCTION

There was no significant armament industry in Hungary before the compromise of 1867. After the compromise, Hungary made great efforts to establish weapon factories. This essay gives an overview of the armament industry of Hungary between the years 1867 and 1945.

2. SMALL ARMS AND LIGHT WEAPONS (SALW), CANONS/HOWITZERS AND AMMUNITION

2.1. SALW AND AMMUNITION

After the War Office in Vienna decided to found a second production site for pistols, revolvers and rifles, plants for the production of weapons were established in Hungary. In 1887, the Hungarian Industrial and Commercial Bank A.G. in close cooperation with the German weapons manufacturer Löwe founded the Arms and Machine Manufacturing Company in Budapest, but in 1890 it had to declare bankruptcy. However, it was very soon re-established as Fegyver és Gépgyár (FÉG)², a public company, in 1891. In 1896, the talented weapons designer Rudolf Frommer³ joined the company and began developing pistols. The production figures were impressive: Between 1912 and 1918, FÉG produced the Mannlicher repeating rifle model M1895 in licence and nearly 250 000 pieces of Frommer stop pistols. Between 1931 and 1935, FÉG produced Mannlicher M1931 rifles, and between 1943 and 1948 nearly 91 500 pieces of Mannlicher M1943 rifles were produced. FÉG also produced machine-guns, especially the type Schwarzlose⁴.

²<https://docplayer.hu/5816553-Sarkozi-zoltan-szilagyi-gabor-gaspar-ferenc-a-fegyvergyar-tortenete-1891-1948.html> (retrieved 28 December 2018)

³ https://hu.wikipedia.org/wiki/Frommer_Rudolf (retrieved 28 December 2018)

⁴<https://docplayer.hu/5816553-Sarkozi-zoltan-szilagyi-gabor-gaspar-ferenc-a-fegyvergyar-tortenete-1891-1948.html> (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

Another important company that made small arms was Manfred Weiss, which manufactured weapons and ammunition from the mid-1880s and, starting in 1892, also cartridges. Danuvia, a smaller weapons manufacturer, produced a machine-gun which was developed by Ferenc Gebauer⁵. Furthermore, 11 000 Gebauer submachine guns were produced at Danuvia. The most important ammunition manufacturers were FÉG and Weiss.

2.2. CANONS/HOWITZERS⁶

The production capacities for canons were low in Hungary. Nevertheless, during the time of the Imperial and Royal (or *k.u.k.*) Monarchy, Hungary produced artillery pieces for Škoda at a modern canon-factory in Győr⁷, at Magyar Királyi Államvasutak Gépgyára (MÁVAG) and at DIMÁVAG Diósgyőr Gépgyár under license. During the interwar period and during the Second World War, Hungary also produced a small number of canons and howitzers in the towns of Budapest, Győr and Diósgyőr.

3. MOTOR VEHICLES⁸

Army motorization in Hungary can be seen as part of the motorization of the *k.u.k.* Army. The troops of the *k.u.k.* Army which were set up in the Hungarian half of the empire were equipped with motor vehicles from Austro-Hungarian production. In the Hungarian part of the monarchy, the Hungarian Wagon and Machine Factory in Győr (Rába Magyar Vagon-és Gépgyár), which was founded in 1896, began with the construction of automobiles of the brand "Rába" in 1902. As early as 1903, the company received an order for the construction of a trackless vehicle. The vehicle was called the "Tlaskal Train". Ludwig Tlaskal Edler von Hochwall was a captain in the General Staff Corps who was responsible for the motorization of the army. The vehicle was designed for a payload of 10 tons, and it had 4-wheel steering and 4-wheel drive. It allowed the attachment of five platform trailers. However, because of serious shortcomings revealed in the tests carried out by the army authorities (for example, the braking distance on a slope was more than 200m), the vehicle was returned to the manufacturer.

In preparation for a major war in Europe, the *k.u.k.* monarchy also sought to make available as many cars and trucks as possible. The model which was realized became a part of the mobilization efforts of the monarchy under the slogan "subsidy trucks". The standardized types of vehicles were produced by the vehicle manufacturers of the monarchy. The Ministry of War provided a subsidy fund in the amount of 4 million Austrian crowns for the

⁵ https://en.wikipedia.org/wiki/Franz_Gebauer (retrieved 28 December 2018)

⁶ Balla Tibor – Csikány Tamás – Gulyás Géza – Horváth Csaba – Kovács Vilmos: *The History of the Hungarian Artillery 1913–2013*. Zrínyi Kiadó, Budapest, 2015.

⁷ Krámlí Mihály: *A Győri Magyar Ágyúgyár Rt. felállítása 1911–1914. Hadtörténelmi Közlemények*, 123 (2010/4). pp. 1005–1014.

⁸ Spielberger, Walter J.: *Kraftfahrzeuge und Panzer des Österreichischen Heeres 1896 bis heute*. Motorbuchverlag, Stuttgart, 1976, pp. 18–88.

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

purchase of 400 trucks. Each buyer of a subsidy truck received a grant of 10 000 Austrian crowns in the case of purchasing a vehicle. The purchaser had to undertake to keep the vehicle in perfect condition for five years and, if necessary, to make it available to the army administration. The vehicles themselves had to comply with certain building regulations. Thus, the scale, wheelbase, gauge, load capacity, paint and equipment were standardized. The design specified a 3-tonner and a 5-tonner. Shortly before the outbreak of the war, for political reasons, larger contracts for motor vehicles were awarded to companies whose business operations were located in the Hungarian half of the Monarchy. The vehicle manufacturers Ganz and Rába benefited from these larger orders.

After the First World War, the development of the Hungarian Armed Forces was stopped by the regulations of the Peace Treaty of Trianon, the chronic shortage of money, and the lack of existing industrial capacity for motor vehicles. The Hungarian forces of the 1920s were therefore largely equipped with the old vehicles, which had already been in use during the First World War. It was only at the beginning of the 1930s that some artillery tractors of the type Pavesi and Breda were bought in Italy, and 70 tractors were produced under license in Hungary by Hofherr Schranz. The tractors were named KV-40 and KV-50, and they looked more like a commercial agricultural tractor than an artillery tractor. Other off-road vehicles were produced in small numbers at Csepel, Rába and MÁVAG. It was not until 1936 that Hungary acquired a civilian 2 1/2 tonner from the Ford plants in Cologne for the mobile brigades. These vehicles formed the backbone of the motorized units until Hungarian companies, especially Csepel, were able to produce vehicles in larger numbers. As of December 1, 1940, the Hungarian army's vehicle-fleet consisted of 643 motorcycles, 724 passenger cars, 953 trucks, 362 ambulance vehicles, 162 all-terrain passenger cars and 1,882 all-terrain trucks. After 1940, the Győr Vagon licensed 300 pieces of the 1 1/2 ton Rába-Austro-Fiat, as well as a MÁVAG Mercedes 1 1/2 tonner and a Rába-Super 2 1/2 tonner.

4. THE MILITARY AIRCRAFT PRODUCTION

The modern military aviation⁹ of the Austro-Hungarian Empire began in 1890 with a balloon course on a voluntary basis for 8 officers. In 1893, an aeronautical institution was established in the Arsenal of Vienna, which was renamed the Airship Division in 1911. Also in the year 1911, the first army pilot school was founded in Wiener Neustadt. With the takeover of the operational management in 1912 by Major Emil Uzelac¹⁰, a native of Hungary, new decisive impulses were given to the development of military aviation.

⁹ https://de.wikipedia.org/wiki/K.u.k._Luftfahrtruppen (retrieved 28 December 2018)

¹⁰ https://de.wikipedia.org/wiki/Emil_Uzelac (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

	Army						Navy					Sum
	1914	1915	1916	1917	1918	Proto- types	1914	1915	1916	1917	1918	
Lloyd	x	31	63	84	104	18	x	x	x	x	x	300
UFAG	18	39	186	333	352	2	x	x	69	80	36	1115
MÁG	x	x	x	56	145	1	x	x	x	x	x	202
Sum	18	70	249	473	601	21	x	x	69	80	36	1617

Table 1: Production of military aircraft in Hungary between August 1914 and October 1918 (Source: Grosz, p. 475.)

MAGYAR REPÜLŐGÉPGYÁR RT (MARE) – HUNGARIAN AIRCRAFT FACTORY – UNGARISCHE FLUGZEUGWERKE (UFAG)¹¹

The Hungarian aircraft factory was founded on November 6, 1912 by Camillo Castiglioni, Ludwig Lohner and the two Hungarian companies Ganz & Co and Manfred Weiss as the Hungarian Airship and Flying Machines Company. At the beginning of 1914, UFAG received an order to produce 18 Lohner Type C biplanes. Since the production facilities in Budapest soon became too small, a modern production facility in Albertfalva in the south of Budapest was established at the end of 1914 and the name was changed to the Hungarian Aircraft Factory (UFAG). During the First World War, the company made great efforts to achieve a high monthly output of aircraft by establishing mass production. The highest production figures were achieved in 1918, with an average of 35 aircraft per month. By 1918, the workforce had increased to 1,700 workers. In total, UFAG produced 1,115 aircraft for the army and navy.

	1914	1915	1916	1917	1918	Summe
Lohner B II	18	x	x	x	x	18
Lohner B III	x	8	x	x	x	8
Lohner B IV	x	8	x	x	x	8
Lohner B VII	x	23	1	x	x	24
Brandenburg C.I	x	x	184	322	229	735
Brandenburg G I	x	x	4	8	x	12
UFAG C.I	x	x	x	3	123	126
Sum	18	39	189	333	352	931

Table 2: Aircraft production of UFAG 1914–1918 (Source: Grosz, p. 265.)

¹¹ <https://faipar.hu/hirek/par-perc/8187/favazas-repuelogepek-gyara-albertfalvan-1914-1918> (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

After the Phoenix plants, the UFAG was the second most important aircraft producer of the k.u.k. Monarchy. The most popular type of aircraft produced was the Model Brandenburg C.I., a biplane. After the First World War, UFAG continued to produce 60 airplanes for the Hungarian Red Army in 1920. After the end of the Communist regime, MARE was bought by the Neuschloss-Lichtig aircraft factory and Holzindustrie (wood industry) corporation.

MAGYAR LLOYD REPÜLOGÉP ÉS MOTORGYÁR R. T.– HUNGARIAN LLOYD AIRCRAFT AND MOTOR WORKS CORPORATION¹²

The foundation of the Hungarian Lloyd Aircraft and Motor Works Corporation goes back to an initiative of the technical director of the Deutsche Flugzeugwerke (German Aircraft plant) Heinrich Bier, who was an Austrian aviation pioneer and reserve officer and who had set several flight records and who had excellent contacts to the highest public authorities. On April 14, 1914, the Hungarian Lloyd Aircraft and Motor Works was founded in Aszód and officially opened on May 8, 1914. The plant received its first order on July 29, 1914 but production did not begin until February 1915. The plant produced in-house designs and licensed production of the Aviatik model. After the war, Lloyd produced a small number of aircraft.

	1915	1916	1917	1918	Sum
Lloyd C.I	13	x	x	x	13
Lloyd C.II	18	52	x	x	70
Lloyd C.III	x	8	x	x	8
Lloyd C.IV	x	3	16	x	19
Lloyd C.V	x	x	63	32	95
AviatikC.I	x	x	5	38	43
Aviatik D.I	x	x	x	31	31
Prototypes	x	x	x	3	3
Sum	31	63	84	104	282

Table 3: Production of Aircraft of Hungarian Lloyd 1915–1918 (Source: Grosz, p. 192.)

¹² https://hu.wikipedia.org/wiki/Magyar_Lloyd_Repülőgép_és_Motorgyár (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

MAGYAR ÁLTALÁNOS GÉPGYÁR (MÁG) – HUNGARIAN GENERAL MACHINE FACTORY CORPORATION¹³

The Hungarian General Machine Factory Corporation was founded in 1886 under the name Podwinecz & Heiszler to produce agricultural machinery and tools. In 1912, the name was changed to Hungarian General Engineering Works Ltd. and since then the factory has constructed automobiles. MÁG entered into a business relationship with the Austro-Hungarian Air Force in 1914 and supplied the aircraft industry with aircraft engines. In 1916, MÁG established in Mátyásföld Budapest a production plant for aircraft and produced Fokker aircraft under license and aviation aircraft from 1917 on. During the war, around 500 aircraft engines were built. MÁG was the only aircraft company in the k.u.k. Monarchy which produced aircraft and aircraft engines. After the war, the production of aircraft ended and MÁG only provided services to the Hungarian Air Force.

	1917	1918	Sum
Fokker B. III	7	x	7
Fokker D.I	7	x	7
Fokker D.II	42	x	42
Aviatik C.I	x	24	24
Aviatik D.I	x	121	121
Prototype	-	-	1
Sum	56	145	202

Table 4: Aircraft Production of MÁG 1917–1918 (Source: Grosz, p. 3.)

A particularly interesting chapter of the Hungarian aviation industry is the development of helicopters. Lieutenant Dr. Theodor von Kármán and Lieutenant of the technical branch Wilhelm Zurovec made a number of empirical experiments on the movements of helicopters¹⁴. In August 1917, MÁG was charged with building a model in the original size of a helicopter based on the studies of Kármán and Zurovec. This model, known as PKZ 1, produced evidence of the operability of propulsion which is able to launch an aircraft vertically. Further experiments were carried out with a model of the PKZ 2 and with the so-called Asbóth helicopter, which was produced in the FAG plant. The end of the war and the ban on the manufacture of aircraft ended the promising trials to develop helicopters.

During the communist regime in the first post-war years, some aircraft were produced at the three aircraft factories mentioned above. After the collapse of the communist republic, aircraft production continued at a low level. However, after the treaty of Trianon, the aircraft industry in Hungary had to be stopped. Furthermore, Hungary was not allowed to maintain

¹³ https://hu.wikipedia.org/wiki/Magyar_Általános_Gépgyár (retrieved 28 December 2018)

¹⁴ <https://en.wikipedia.org/wiki/Petróczy-Kármán-Zurovec> (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.kesz.17

2019. XII. évf. Különszám

an airforce. Under the supervision of the Control Commission, 108 aircraft and 220 aircraft engines were destroyed. After the relaxation of the strict regulations concerning military aviation in 1922, Hungary was able to establish a new airforce¹⁵. Hand in hand with the reactivation of the air force, a repair facility for aircraft in Székesfehérvár-Sóstó was established in 1925. The true purpose of this facility was the construction of aircraft of the type Hansa-Brandenburg B I. (Kis Brandi) and Fokker D VII. To further equip the airforce, Weiss in Budapest received the license to produce 40 German Udet U 12 Flamingos, which were delivered from 1929 on as Hungaria IV. Before this order, Weiss had already manufactured 27 Heinkel HD 22s for the Hungarian airline company Magyar Légiforgalmi Részvénytársaság-MALÉRT. Furthermore, Weiss produced 50 Fokker C VD and WM 16 A and B Budapest I and II for the Air Force and some CV E for MALÉRT. At the beginning of the 1930s, Weiss and the repair facility produced several improved versions of the Flamingo. The repair plant made some efforts to develop a new fighter aircraft. However, all these efforts only led to the development of the prototypes Avis I, II and III, all of which did not meet the requirements. In 1938, Győri Vagonygyár started producing aircraft and subsequently produced the WM 21 Sólyom (Falcon), a biplane for tactical reconnaissance. In addition, MÁVAG made preparations for the production of aircraft.

During the Second World War, the Duna Repülőgépgyár produced in Horthyliget, Magyar Állami Vagon és Gépgyár (MÁV) in Kőbánya in Budapest, the Magyar Vagon és Gépgyár in Győr and Pestszentlőrinc Ipari Telepek (PIRT) in Budapest. Furthermore, joint ventures were formed to increase production, for example Manfred Weiss and Steyr Daimler Puch for the production of the DB 605 aircraft engine, and between Duna, MÁVAG and MWG and the Wiener Neustädter Aircraft to increase the production of the Messerschmitt Me 109G. However, Allied bombing made an increase in production almost impossible, and as a result the production of the Me 109G had to be relocated in the summer of 1944 to the basement of the Kőbánya Brewery. During the war, PIRT produced 22 Ju52/3m, MWG 72 Fw 58B Weihe and 299 Messerschmitt Bf109, FAG 25 Bf 109G, MÁVAG 192 Re 2000 Héja II and 80 Levente II.

5. THE PRODUCTION OF BATTLE TANKS AND ARMORED VEHICLES¹⁶

The Treaty of Trianon prohibited the operation of armored troops. Because Hungary had ordered 14 LKII tanks in Sweden before the signing of the peace treaty on 4 June 1920, these tanks were secretly delivered across the Danube and unloaded at a secret location in Hungary. Then, the tanks were transported by rail through Hungary to hide them from the Control Commission. It was not until the mid-1920s that the control was relaxed and Hungary could think of a rearmament with heavy equipment. In the mid-1920s, a diplomatic

¹⁵ Punka György – Sárhidai Gyula: Magyar sasok. A Magyar Királyi Honvéd Légierő 1920–1945. Zrínyi Kiadó, Budapest, 2007, p. 7ff.

¹⁶ http://www.tanks-encyclopedia.com/ww2/hungary/ww2_Hungarian_Tanks.php (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

offensive and a rapprochement with Italy and the German Reich began. In the end, these contacts led to the procurement of Italian-made FIAT CV 33 tanks in the mid-1930s. At the same time, Manfred Weiss developed an armored wheeled vehicle, which was delivered as 39 M Csaba in 1940. The Csaba was based on the Straussler AC-III, a British vehicle, which, however, was developed by the Hungarian designer Mike Straussler¹⁷. The first prototype AC I was produced in 1934, and a second prototype AC II in 1935. Following successful test drives, 81 pieces of the 39M Csaba and 12 pieces of the 40M command vehicle were ordered by the Ministry of Defence.

	39 M CSABA	40M CSABA
Weight in tons	5,9	5,8
Crew	4	4
Velocity in km/h	65	70
Armament	1 Tank Canon 2 cm 1x 8mm MG, 1x 8mm IMG	1x 8mm MG
Armor in mm	9-13	9-13

Table 5: Technical data of CSABA (Source: Muijzer, p. 66–67.)

In 1936, Italy delivered 150 light tanks FIAT CV 33. These tanks were stored in Hajmáskér and Örkénytábor. There was no experience at that time in Hungary in the construction of main battle tanks. Because Hungary was forbidden to produce tanks, the development work for a main battle tank began secretly at the Weiss plant under the code name V-3 (vontató = tractor). In 1933, Mike Straussler, who worked for Manfred Weiss as a designer, presented plans for a light battle tank to the Hungarian army staff. In 1936, two prototypes of the V-4 were built. After some modifications, the V-4 was presented to the Ministry of Defense in 1938. Around 1936, some L-60s were purchased by Landsverk in Sweden for testing purposes. The L-60 and V-4 were then tested and the L-60 proved to be the better tank. As a result, the Ministry acquired the license rights of the L-60. The L-60 was then manufactured as 38M Toldi I at MÁVAG and Ganz. Until 1941, 85 pieces of Toldi I were made. From 1941, Hungarian industry was able to produce an improved version of Toldi I, the Toldi II, from which 110 pieces were made at MÁVAG (42 pieces) and Ganz (68 pieces). In 1943, the type Toldi III was produced with a better armor protection and better armament. There are no records of the production and the exact number of tanks completed. After a market observation, Hungary acquired the license rights for the construction of the tank hunter Landsverk L-62. The tank hunter or the antiaircraft tank “Nimrod” was built in 1940 at MÁVAG. The tank hunter version was armed with a 4 cm cannon, the antiaircraft tank with a 4 cm Bofors canon. A total of 135 Nimrods were produced at MÁVAG. Furthermore, ideas for an armored personnel carrier “43 M Lehel” were developed. Because of

¹⁷ https://en.wikipedia.org/wiki/Nicholas_Straussler (retrieved 28 December 2018)

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

other priorities, these ideas were never realized. Because the tanks of the Toldi series were light tanks, the need for medium-sized battle tanks arose. The decision was made to produce a product of the Axis power under licence. The choice fell on the battle tank Škoda T-21. In August 1940, Hungary got the license rights and the first produced tank came under the name Turan I to the tank school in Esztergom. A total of 285 Turan I tanks were produced (59 at MÁVAG, 70 at Manfred Weiss, 74 at Ganz, 82 at Magyar Vagon). Based on their experience in the theater of war in the Soviet Union, the General Staff recognized the need for a heavy battle tank. The new tank was developed on the basis of Turan I. In 1942 the first prototype was presented and 145 heavy Turan II were completed by 1944 (54 at Weiss, 36 at Ganz and 55 at Magyar Vagon).

	Weight in Tons	Crew	Velocity in km/h	Armament	Armor in mm
Toldi I	8,5	3	50	4 cm Tank Canon 1 x 8 mm MG	5-13
Toldi II	8,5	3	50	4 cm Tank Canon 1 x 8 mm MG	5-13
Toldi IIA	9,35	3	47	4 cm Tank Canon 1 x 8 mm MG	5-35
Toldi III	9,45	3	47	4 cm Tank Canon 1 x 8 mm MG	5-35
Nimrod	10,5	6	50	4 cm Tank canon	6-28
Lehel	10,2	1 + 8	46	1 IMG	6-20

Table 6: Technical data of Toldi und Nimrod/Lehel (Source : Muijzer, pp. 53 and 57.)

The most effective Hungarian armored vehicle was the Zrínyi assault gun. The assault gun was mounted on the chassis of the Turan and had a 10.5 cm howitzer as the main weapon. The first Zrínyi did not join the army until March 1944. A total of between 40 and 66 Zrínyi (exact production figures are not available) were produced by Weiss and Ganz.

Towards the end of the war, Manfred Weiss also developed some designs for more powerful battle tanks and assault guns. On the basis of the German main battle tank Panther, the 44M Tas was developed, which had an assault gun Tas on the chassis. However, the M44 Tas did not progress beyond the stage of a prototype, and the Tas assault gun did not go beyond the drawing board.

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

	Weight in Tonnes	Crew	Velocity in km/h	Armament	Armor in mm
40 M Turan	18,2	5	47	1x 4 cm Tank Canon 2 MG 8 mm	13-50
41 M Turan	19,2	5	45	1x 7,5 cm Tank Canon 2 MG 8mm	13-50
43 M Turan	22-23	4-5	47	1x 7,5 cm Tank Canon 2 MG 8mm	13-90/95
Zrínyi	21,5	4	43	1x 10,5 cm Howitzer	13-75

Table 7: Technical data of Turan und Zrínyi (Source: Muijzer, pp. 61 and 63.)

6. NAVAL SHIPBUILDING¹⁸

6.1. BLUE-WATER NAVY SHIPBUILDING

Since 1862 there had already been 12 shipyards with 150 workers in the area of Fiume. After the compromise with Austria, the Hungarian government was not able to develop plans for the economic expansion of Fiume due to domestic difficulties until 1870. Near Fiume the Emperor Charles VI. had already founded the Arsenal Porto Ré. This shipyard had an eventful history. In the Peace of Campo Formio in 1797, the Republic of Venice fell to the victor Napoleon. At this point, shipbuilding stopped. In 1834, the area of the naval yard was leased and in 1836 the first war-paddler-steamer of the k. u.k. Navy, Marianna, was launched. After that only repair work was done. In 1900, the facility was leased by Giuseppe Martinolich, who gave it to Josef Lazarus the same year. Torpedo boats were manufactured there under license from the English shipyard Yarrow & Co until 1905. In 1892, influential merchants and industrialists from Fiume contacted the German Howaldtswerft in Kiel and in the same year the shipbuilding company Fiume Howaldt & Co. was founded. The shipyard was initially equipped with old machines from Kiel, which enabled the shipyard in Kiel to equip the naval yard with the most modern machines. The cooperation with the German shipyard existed until 1903. Then Howaldt had to go. According to reports, the cooperation with Fiume had resulted in a loss of about 500 million mark. At the beginning of 1905 there was a push by Hungarian financial circles and in 1905 the shipbuilding and machine works Danubius (Danubius Hajó-és Gépgyár R.T.) was founded and the site of the former Howaldtswerft was transferred. Ten days after the founding of Danubius, the Lazarus shipyard burned down, leaving 300 workers unemployed. This unexpected event enabled the new company Danubius to find skilled workers immediately. As early as 1906, the Danubius shipyard received the contract for the construction of destroyers of the Huszár class and of torpedo boats of the Kalman class. In order to impro-

¹⁸ Baumgartner L. und Sieche E.: Die Schiffe der k.(u.)k. Kriegsmarine im Bild-Band 2. Verlagsbuchhandlung Stöhr, Wien, 2001, 271–276 and 329–335.

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

ve its capital base, Ganz & Co. and Danubius merged in 1911. Regarding the work process, this fusion meant that the engines, turbines, electrical equipment and semi-finished castings from the Ganz factory in Újpest in Budapest were brought to Fiume to be used for the final production. The number of workers rose from 2,100 in 1911, to 2.397 in 1912 and to 2,812 in 1915. Between 1907 and 1918, the shipyard produced 108 war ships and only one ship for civilian purposes. The largest warship built in Fiume was the battleship "Szent Istvan", which was put into service on November 17, 1915 and was sunk on June 10, 1918 by the torpedoes of an Italian MAS.

Another shipyard in Fiume is associated with the name Robert Whitehead. Whitehead was an English technician and businessman who together with the Austrian naval officer Luppis is considered the inventor of the operational torpedo. Whitehead became the director of the Stabilimento Tecnico Fiumano in 1875 and established a torpedo production. In 1907 the British armament company Vickers Ltd. Armstrong-Whitworth & Co became the main shareholder in this company. The company produced the single-hull boats S.M. U 5, 6 and 12 for the k.u.k Navy.

6.2. BROWN-WATER NAVY SHIPBUILDING

Immediately after the compensation in 1868, the First Hungarian Pest-Fiume Shipbuilding Company (Első Magyar Pest-Fiumei Hajógyár R.T.) was founded in Újpest. In 1870/71 the two Danube monitors Maros and Leitha were built on the shipyard. Other Danube monitors, Szamos and Kórós, were built at the shipyard Schönichen & Hartmann (Magyar Leszámitoló Kazangyára) in Budapest / Újpest in 1891/92. After that, in a ten years' rhythm, further monitors were produced in Budapest. In 1903/04 Temes (I) and Bodrog were produced in the united shipyard Danubius-Schönichen-Hartmann egysült Hajó-és Gépgyár R.T.. During the war, Wels, Barsch, Compó (Tench) and Viza (Hausen) were built in the yard of Ganz & Co-Danubius Gép-, Waggon- és Hajógyár R.T in Újpest and put into service in 1916. In the interwar period, the defense budget did not allow any more new construction. Only after the occupation of the southern parts of Slovakia were efforts made to expand the brown-water fleet.

In 1939, at the shipyard of Laczkovics in Budapest 11 unarmed mine-laying ships of type AM were built at the Danubius shipyard of Ganz and the development of a speedboat was started. The speedboats were armored up to 40 mm and had a 4 cm turret. They were thus the most modern ships of the Danube Riverfleet.

CONCLUDING REMARKS

As the essay shows, during the days of the Austrian-Hungarian empire, the Hungarian armament industry offered a wide range of products. After the First World War until the end of the Second World War, the achievements of the Hungarian armament industry show us that it is also possible for a smaller state to operate an efficient armament industry, but only to the limits of what is possible.

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám

Post Scriptum: József, thank you for your friendship, stay healthy, and don't get too excited when Újpest FC loses!

BIBLIOGRAPHY

1. Balla Tibor – Csikány Tamás – Gulyás Géza – Horváth Csaba – Kovács Vilmos: The History of the Hungarian Artillery 1913–2013. Zrínyi Kiadó, Budapest, 2015.
2. Baumgartner L. und Sieche E.: Die Schiffe der k.(u.)k. Kriegsmarine im Bild-Band 2. Verlagsbuchhandlung Stöhr, Wien, 2001.
3. Grosz Peter: Hadow George: Austro-Hungarian Army Aircraft of World War One. Flyer Machines Press, Boulder, 1993.
4. Muijzer P.: The Royal Hungarian Army 1920–1945, Volume II (Hungarian Mobile Forces). Axis, Bayside, 2000.
5. Pánczél Mátyás – Szekeres József – Végh Ferenc: A magyar páncélosalakulatok története – Harckocsik, páncélosok a magyar haderőben. Zrínyi Kiadó, Budapest, 2015.
6. Punka György – Sárhidai Gyula: Magyar sasok. A Magyar Királyi Honvéd Légierő 1920–1945. Zrínyi Kiadó, Budapest, 2007.
7. Spielberger, Walter J.: Kraftfahrzeuge und Panzer des Österreichischen Heeres 1896 bis heute. Motorbuchverlag, Stuttgart,

HADTUDOMÁNYI SZEMLE

DOI: 10.32563/hsz.2019.1.ksz.17

2019. XII. évf. Különszám
