

One Hundred and Fifty Years of Higher Technical Education in Croatia

Dedicated to the 90th anniversary of the establishment of a Higher Engineering School in Zagreb

One hundred and fifty years of higher technical education in Croatia can be divided into three periods: the second half of the nineteenth and beginning of the twentieth century up to the end of the 1st World War; the period up to 1956 when several autonomous engineering faculties, which had separated from the University's Faculty of Engineering, were established. The third period characterises restructuring of the engineering faculties within the framework of the University of Zagreb and establishment of engineering faculties outside Zagreb (1960).

Quite often the inception of higher technical education in this area is linked to the commencement of work of the Higher Engineering School in Zagreb in 1919 and, accordingly, this year, the legal successors of the Higher Engineering School in Zagreb have been celebrating the 90th anniversary of its foundation. However, the genesis or origins of systematic higher technical education in Croatia stretch back to the middle of the nineteenth century. It can be linked to a ruling by the Austro-Hungarian Monarchy on the relocation of the Imperial-Royal Naval Academy (*Kaiser und Keniny Marine-Akademie*) from Trieste to Rijeka and construction of a building serving the requirements of the newly-established Higher Education Military School in 1857¹. Giovanni Ciotta, a large estate owner and grandson of Rijeka's mayor, Ljudevit Adamič, was educated to become a civil engineer in the Military Academy in Vienna and on completion of active military service in Verona and Venice, he returned to his home town to take up his engineering profession. During his education and service in the army, he befriended the baron, Maximilian de Sterneck, an admiral of the Austrian Navy, who lent him considerable assistance and support in procuring a ruling from the imperial Court to build an Academy in Rijeka. The location of the Naval Academy in Rijeka was, in fact, no mere coincidence; the Imperial Court in Vienna had already gleaned the strategic importance of the town. Pula, in point of fact, was greatly exposed to attack from the sea and had been designated the main naval port. Rijeka, geographically thrusting deeply into the landmass with favourable conditions in the hinterland and better connections to Vienna, was ideally suitable for building ships and steam engines. As an important commercial port, it had developed trade ties and provided facilities for delivery of supplies.

In the middle of the XIX century in Rijeka, the fledgling Imperial-Royal Naval Academy began to lay solid foundations for a four-year study program of engineering disciplines, which outlined a profile of highly-trained qualified manpower for the requirements of the contemporary Austrian navy. This was an example of exceptional link-ups simultaneously, i.e. the alliance of profession, science and education. It was an era which heralded the beginning of steel boat production, steam boilers and steam engines, the invention and successful manufacture of a war weapon – the torpedo, the scientific achievement of Ernst Mach's and Peter Salcher's photographs of breaking the sound barrier. Directly influenced by global engineering accomplishments, higher technical education enters the field of shipbuilding and ship engine manufacturing. Shipbuilding and mechanical engineering were at a global level in Rijeka and Pula at that time. Europe had schools for higher technical education and the curriculum and program of the Naval Academy were on a par with similar curricula and programs of higher engineering studies in contemporary leading European states. During this era Austria was among the first states in the continental part of Europe to launch construction of iron ships. Accordingly, from an early stage, the curriculum at the Naval Academy in Rijeka encompassed subject matter from the specialised area of design and construction of iron ships as well as steam engines. From general subjects on the curriculum, the following took precedence: higher mathematics, descriptive geometry and drawing, physics, chemistry, thermodynamics, mechanics and hydromechanics parallel with specialised subjects of shipbuilding, steam engines, tensile modelling technology and ship equipment.

During that time Austria had established a scientific-technical system organised for construction of a powerful war fleet with corresponding training for technical manpower. Accordingly, in 1866 in Pula, the Imperial-Royal Marine-Technical Committee was set up comprising 8 sections with over 50 engineers of shipbuilding, mechanical engineering and electrical engineering professions. Mention was first made of the Imperial-Royal Marine Committee (*K.K. Marine-Technisches Komitee*) with its headquarters in Pula, representing an institute par excellence for technical affairs in the Austrian navy. That Committee, in fact, was organised along the lines of a scientific-technical system overseeing the construction of a formidable war fleet as well as training of skilled manpower. The Committee included the following sections: shipbuilding, mechanical engineering, artillery, torpedo construction, sea blasting, technology and electrical engineering, hydrography and navigation as well as a marine library.

¹ Several authors, Monograph of the Engineering Faculty, University of Rijeka, Rijeka, 2000.

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K u k (Kaiser und Kunst) Marine Bibliothek i.e. the Imperial-Royal Marine Library with exceptionally rich holdings of general, technical and uniquely specialised literature of military disciplines was established for the requirements of highly-trained and qualified personnel from the navy and played a crucial role in the work of the Naval Academy in Rijeka. In other words, this indicated that already by the middle of the XIX century in the north-western region of Croatia, Rijeka and Pula, the scientific disciplines of shipbuilding, mechanical engineering and electrical engineering were systematically fostered. As the Austro-Hungarian Monarchy was a state with several nations, the teaching staff and students at the Academy were from all regions of the Monarchy, with representation of Croatian nationality at an admirable level. The Naval Academy in Rijeka worked continuously up until the end of the 1st World War 1918. The Academy, with its four-year study course, was not only a school for learning about military disciplines but a proper engineering faculty which educated engineers in the shipbuilding-mechanical engineering-electrical engineering professions.

The professional associations of that period bear witness to the fact that the engineering profession, including other regions of Croatia, boasted large numbers in the second half of the XIX century. Guild affiliation of engineers and technicians from the engineering profession set in motion the organisation of an engineering association which was established in 1878². Mechanical engineers and shipbuilding engineers cannot arrogate this legal succession as, at that time, the Croatian Engineering Association was a joint title for variously-named societies compatible with the spirit and circumstances of the era. This is strikingly manifested in 1919 with the establishment of the Higher Engineering School.

In the period between the two world wars, a significant number of mechanical engineers, shipbuilding engineers and electrical engineers were educated abroad. Some of them left an indelible mark on the shipbuilding and mechanical engineering professions.

This year and the forthcoming year we are celebrating several anniversaries linked to higher technical education in Croatia, which includes shipbuilding³. University engineering studies in Croatian language began in this region ninety years ago at the Higher Engineering School in Zagreb. One of the study courses at that faculty was Electrical Mechanical Engineering. That higher education school developed over the years into the Engineering Faculty University of Zagreb. In the middle of the fifties (1956), several engineering faculties evolved within the framework of the University of Zagreb and, accordingly, these faculties are celebrating this year the 90th anniversary of foundation. Here, we can mention four of the largest: Faculty of Architecture, Faculty of Electrical Engineering and Computer Sciences, Faculty of Mechanical Engineering and Shipbuilding University as well as the Faculty of Civil Engineering.

1956 – 1960 marked a period of restructuring at the Engineering Faculty in Zagreb; the Faculty of Mechanical Engineering and Shipbuilding as well as Electrical Engineering Faculty become separate faculties.

Next year, the Faculty of Electrical Engineering, Mechanical Engineering and Shipbuilding University in Split as well as the Faculty of Engineering University of Rijeka will celebrate the 50th anniversary of their foundation. This year, we are marking forty years of university education of shipbuilding engineers at the Engineering Faculty in Rijeka. These two faculties developed within the environment of a strong shipbuilding industry as well as marine diesel engine production.

Over the last fifty years, shipbuilding and marine diesel engine production have become the mainstay of Croatian industry. Shipbuilding centres in Pula, Rijeka and Split foresaw the need to produce marine diesel engines and so production of marine engines began parallelly in Split under the MAN licence (1961), in Pula under the licence of Burmeister & Wein (1956) and in Rijeka under the licence of Sulzer (1967). This production is at a global level. Recession in the shipbuilding industry impacts on the need for restructuring and production of diesel engines and, consequently, Pula and Split shipbuilding industry merged this production while Rijeka's shipyard continues under the name of the new owner Wärtsilä. Until today Croatia have shipyard produced a total power of 8.7 GW.

Today we can state that we are a country with a longstanding tradition in shipbuilding and mechanical engineering and are well-known on the world market. This can be attributed to the one hundred and fifty years of first-class higher education of engineers of electrical engineering, mechanical engineering and shipbuilding in this region.

What will reorganisation and privatisation of Croatian shipbuilding, shipbuilding industry and mechanical engineering, especially production of large diesel engines, bring in the future? Let us hope that we shall not be witnesses to the erasure of a longstanding tradition of shipbuilding and mechanical engineering production in Croatia.

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² Marijan Brezinščak, Croatian Engineering Association, first vol.. Contribution celebrates 115th anniversary 1878 – 1993 Croatian Surveyors Society, Zagreb, 1995.

³ Several authors, Monograph of the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb, 2009.