

# ACTIVITIES OF PROFESSOR OF RIGA POLYTECHNICUM / RIGA POLYTECHNIC INSTITUTE HEINRICH MALCHER (1848– 1927) AND HIS CONTRIBUTION TO LATVIA

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**Summary.** In the first decades of its existence, many foreigners worked at Riga Polytechnicum (RP), including one of the most internationally recognized lecturers and scientists, geodesist and hydrotechnician Heinrich Malcher (1848–1927), who continued to work at RP even after the reorganization of the university into Riga Polytechnic Institute (RPI; 1896). For 20 years, the Professor was the Head of the Department of Engineering (1882–1902) of RP / RPI. In addition to his teaching work, H. Malcher designed the water pipeline for Jelgava (1881), led the creation of the first triangulation network of the city of Riga, dealt with the city’s sewage disposal issues, and was an active member of the Riga Technical Society. He spent his twilight years in the Czech Republic, in the village of Kujavy, where he created the first water distribution system and worked as a construction consultant and inspector.

**Keywords:** Riga Polytechnicum, Riga Polytechnic Institute, Heinrich Malcher, water supply.

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## Heinrich Malcher – Czech Engineer with a Diploma from the Zurich Federal Polytechnic School

Heinrich Malcher was born on 7 December 1848 and his native country is Austria [1; p. 43] and the Czech Republic [2] because the country's borders changed as a result of political changes. In the Moravian Village of Kujavy, which is now the territory of the Czech Republic, the Malcher family is said to have lived since 1772, and the name is still honoured there.



**Figure 1.** Heinrich Malcher (The second half of the 19th century).

Jaromír Heryán reports on the Kujavi municipality portal [2] that after studying at the Kujavy Primary School, he continued his education in Hranice, then in Opava. In 1868, H. Malcher went to Switzerland to study at the Zurich Federal Polytechnic School (Eidgenoessisches Polytechnikum Zurich), currently Zurich Federal Technical University (Eidgenössische Technische Hochschule Zürich). In 1872, he obtained an engineering diploma; during his internship, he worked on the regulation of the Danube riverbed near Vienna (Austria) and was invited to work in Riga.

### **Pedagogical and Administrative Work at Riga Polytechnicum / Riga Polytechnic Institute (1874–1902)**

There were several engineers and teachers who had immigrated from Western Europe and worked at RP, but not all of them stayed here for long. Salaries were not high, and job offers also came from other universities. The language of instruction in RP until its reorganization into RPI in 1896 was German. RP hired those who knew the German

language or were native speakers – Germans, Swiss, Austrians. Among them was also H. Malcher, who started working at RP in September 1874 [3]. He was invited to Riga, apparently by someone who knew him and had graduated from or worked at Zurich Federal Polytechnic School. Presumably, it was the Swiss civil engineer Wilhelm Ritter (1847–1906) who started working at RP a year earlier, in 1873. W. Ritter was in charge of Unit B of the RP Department of Engineering (Units, in the modern sense – chairs; Units A and B existed from 1873 to 1877), training 3rd and 4th-year students in special engineering subjects. The purpose of the existence of Units A and B was to give greater independence in planning lectures and their distribution by subjects. Head of Unit B, W. Ritter, increased the number of lessons and introduced a new subject, «Bridge and Tunnel Construction» [4; p. 129]. A new professorship was created – construction of roads, railways, and waterworks, and it needed a lecturer. H. Malcher, a student of W. Ritter, became it. The young, inexperienced engineer and lecturer was sent by the RP Council to Germany, Holland, England, and the USA on experience exchange, where he got acquainted with the latest hydraulic construction experience and used it in the training of young engineers. Docent H. Malcher also taught lower geodesy. In addition to theoretical and practical lessons, together with W. Ritter, during the first year of work in Riga, he organized excursions for students to constructions directly related to the speciality, port buildings in Daugavgrīva and Milgrāvis [5].

In the study year 1875/1876 and in the following years, H. Malcher continued to familiarize himself with local conditions and engineering structures such as the Riga–Daugavpils Railway, Riga water supply, coastal structures of Riga Jūrmala, bridges, construction and operation of railway tracks, etc., involving students in practice. The students carried out practical exercises in geodesy both in Pārdaugava [6] and in Katrīna Dam and other Riga neighbourhoods or nearby territories. In 1877, H. Malcher was elected a professor.

During the academic year 1879/1880, the Department of Engineering organised a construction engineering colloquium for students to introduce them to the latest engineering achievements and connect theory with practice. The construction colloquium was chaired by Professors W. Ritter and H. Malcher. Lectures were given by students of the Department of Engineering and were also attended by practising technicians and engineers [7]. New subjects were included in the training of engineers; the responsibilities of Professor H. Malcher and the titles of the lectures were also changed. In the 1880s, he taught the course «Building Laws. Earth Structures» to 3rd-year students for two

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hours a week in the 1st semester, as well as conducted practical classes in levelling and gave lectures on situation drawing [8].

The courses taught by H. Malcher were related to the main branches of engineering education – the construction of traffic roads, railways, bridges, and hydraulic structures. The aforementioned industries developed rapidly, and the theory of structural mechanics with the correct principles and methods of calculating structural stability began to play an increasingly important role in engineering. This was the field in which the Head of the Department of Engineering (1877–1882), Professor W. Ritter, who left Riga in 1882 and returned to his alma mater in Zurich, carried out research. The responsibilities of the Head of the Department of Engineering were entrusted to H. Malcher, and he was its longest-serving head. H. Malcher headed the Department for 20 years (1882–1902). He retained the professorship of hydraulic engineering and traffic roads. For 20 years from 1882, he was also an inspector of the RP / RPI Library and the manager of Learning Corpus (1887–1902).

H. Malcher was awarded Orders of the Russian Empire – the Order of Saint Stanislaus, 3rd Class (1894), and the Order of Saint Anna, 3rd Class (1896). In March 1897, on behalf of the Minister of People's Enlightenment of Russia, the reorganization of RPI was examined by the Director of the Kharkiv Technological Institute, Professor of Applied Mechanics Viktor Kirpichev (1845–1913). The professors of the Department of Engineering were evaluated relatively positively, although V. Kirpichev evaluated the pedagogical work of Professor H. Malcher as uniform, noting that more important engineering projects are not carried out [4; p. 133]. It is thought that H. Malcher could communicate in Russian, and he did not have problems at work due to his lack of knowledge or insufficient command of it because he was not reprimanded for it, and documents in Russian are also found in his personal file [1; p. 90].

H. Malcher's contemporaries and colleagues who were involved in ensuring water supply, water quality, and sewerage should also be remembered. In the 1870s and 1880s, much was said about the water supply of the city of Riga. Not only local engineers, scientists, and city councillors but also foreign specialists were involved in solving this issue. In 1882, Adolf Thiem (1836–1908), a well-known engineer in the field of hydrology and a specialist in hydrotechnical structures, the pioneer of groundwater scientific research, was invited to Riga. His task was to look for quality drinking water for Riga residents in the surroundings of Riga, because the water from the Riga water supply was not of sufficient quality. Water for Riga was taken from the Daugava; it was not filtered, and silt accumulated in the water pipe, thus the water pipe became clogged. A. Thiem was looking for drinking water at Lake

Jugla and Lake Ķīšezers, which, according to his analysis in RP, proved to be suitable for use and of better quality even than the filtered Daugava water [9].



**Figure 2.** Title page of the book by A. Thiem «Bericht ueber die neuen Bezugsquellen fuer Wasserversorgung der Stadt Riga» (Report on the New Sources of Water Supply for the City of Riga) (1883).

Due to various reasons, residents of Riga continued to use Daugava water even at the end of the 19th century. The implementation of the project took a long time, and engineer A. Thiem refused to cooperate with the people of Riga. The officials responsible for the water supply turned to another specialist for advice – the founder of modern hygiene, Munich Professor Max Josef Pettenkofer (1818–1901), expressed his opinion and concluded that there is clear groundwater and good lakes in the vicinity of Riga; his conclusion was – the water in the vicinity of Bukulti Manor is suitable for residents of Riga, and he wished them to use high-quality water [10]. H. Malcher's colleagues, RP / RPI lecturers – geologist and mineralogist Bruno Doss (1861–1919) got involved in solving water supply issues, gathering the opinions of various specialists related to Riga's water supply, including RP / RPI lecturer, forester Eugen Ostwald (1851–1932), chemical technologist Maximilian von Glasenapp (1845–1923), mechanical engineering specialist Constantin Wladimiroff (1860–?), as well as experts from Germany [11]. Each of the mentioned engineers was involved in solving this issue, for example, chemical technologist M. Glasenapp performed water analyses.

When H. Malcher reached retirement age, he wanted to have rest, so on 1 January 1903, he was released from work at RPI [1; p. 118]. After him, a graduate (1885) of the same Department, Benedikt Wodzinski (1859–1926), was elected the Head of the Department of Engineering, who, together with another graduate (1874) of the Department, Mieczysław von Szystowski (1852–1915?), took over the courses taught by H. Malcher.

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Figure 3. H. Malcher's request to the Minister of People's Enlightenment of Russia to grant a pension (16.11.1902).

## Scientific and Engineering Activities

In addition to teaching and administrative work at the university, H. Malcher conducted research and contributed to geodesy and hydrotechnics. The Riga City Construction Board invited RP professors Alexander Beck (1847–1926) and H. Malcher to participate in the creation of a geodetic network. They also involved students in it. The merit of both engineers is the first triangulation, levelling, and polygonometry networks installed in Riga while simultaneously surveying the situation. In the 1880s and 1890s, they were among the leading specialists in the mentioned fields and created the plans of plots of land, streets and blocks of Riga using the metric system to measure length, which was not yet officially adopted in Russia at that time – it was measured in arshins [12]. From 1880 to 1882, the two professors created the first triangulation network of the city of Riga, leaving a written testimony about it – a small brochure [13].

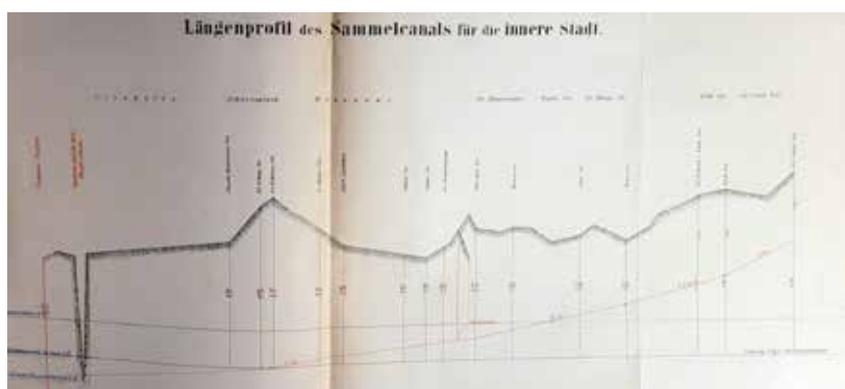
Engineer H. Malcher was interested in the latest achievements in his profession. At that time, achievements in various industries were demonstrated at world exhibitions that lasted several months and took place in different countries. In the second half of the 19th century and the first half of the 20th century, they demonstrated the achievements of industrialization, which attracted the attention of many engineers and citizens. Presumably, H. Malcher visited the World Exhibition in Vienna

in 1873 [14], because he worked near this city. In 1876, he visited the World's Fair in Philadelphia, Pennsylvania, United States of America (USA), and wrote about what he saw there in relation to engineering, such as hydraulic structures in France [15]. Under the guidance of Professor H. Malcher, the students got acquainted with the construction of the water supply and sewerage system of the city of Riga. The professor focused on city sanitation issues in the 1870s, also working in the Riga City Sanitary Committee together with his colleague chemist Franz Weber (1834–1881), doctor Eugen Bochmann (1836–1901) and others [16].

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**Figure 4.** Title page of the book by H. Malcher «Reinigung und Entwaesserung der Stadt Riga» (Cleaning and Sewerage of the City of Riga) (1877).



**Figure 5.** Cross-section of the sewage collection channel for the inner city of Riga (1877).

In 1880, Professor H. Malcher performed the first water analysis for the water pipe in the city of Jelgava [17] and then designed the water pipe network in this city, foreseeing water intake from the Svēte River. In 1881, the City Board built a water pipe with a concrete aqueduct from the Svēte River, according to the project of Professor H. Malcher [18]. It became possible to provide water also in the upper floors of the houses. However, the filter near the Svēte River clogged so often that after only a couple of years, its use had to be abandoned, and unfiltered water was supplied to the city.

The analyses of the water of the Svēte River showed that the water contains organic matter, bacteria and dirt, from which it could be concluded that the water is relatively soft and has a brown tint. This meant that purifying the Svēte River would be difficult and expensive.

H. Malcher was also an active member of the Riga Technical Society and was its Secretary (1878–1879) and Deputy Chairman (1880–1881) [19]. Engineers from various industries worked in the Society, and its members were informed about the latest developments in engineering in the world, including through the Society's publication «Rigasche Industrie-Zeitung» (Riga Industrial Newspaper). H. Malcher also published various articles in this newspaper. The already mentioned article about what was seen at the World Exhibition in 1876 was published in the series of articles «Reiseskizzen» (Travel Sketches) [15], where one could read many of the Professor's articles on various topics and different parts of the world. Some of the articles were related to the study courses taught by the Professor at RP / RPI – about water supply and sewerage in Hamburg and New York, hydrotechnical structures in the Netherlands, deepening of the Seine River in France, New York bridges, harbours, harbour dams in America, as well as about railways in America, trams in Philadelphia (USA), etc. He gave several lectures at the Riga Technical Society, including about the development of railways [20].

H. Malcher's scientific heritage is in the German language, but his students, the successors of his work, were engineers of various nationalities who worked both in Latvia and in other parts of the world. In the history of engineering sciences in Latvia, the Professor's students and successors were the professors of the University of Latvia, geodesist Alwill Buchholtz (1880–1972) and engineer Mārtiņš Bīmanis (1864–1946), known as a specialist in sewerage devices.

## Twilight Years

After retirement, H. Malcher lived with his family in Austria (in the territory of the present Czech Republic) and maintained contact with

Riga. He congratulated the RPI personnel on the university's 50th anniversary in 1912, sending a congratulatory telegram from the city of Fulnek [21]. In anticipation of the mentioned anniversary, the staff of the RPI Department of Engineering proposed to elect H. Malcher as an Honorary Member of RPI, but he was not elected [22].

During World War I, when RPI was evacuated to Russia, the premises of the university on 19 Troņmantnieka (currently – Rainis) Boulevard, in the first years, were used by Russian military institutions; later, when the situation changed – after the German army entered the city, the premises were used by German schools. On 14 October 1918, the Baltic Technical University was opened on the premises of RPI, and H. Malcher was also invited to the opening ceremony, but – like most of the invited foreigners – he did not come [4; p. 202].

While working in Riga, H. Malcher made contributions to the RP Widows and Orphans Fund, which was established in 1875. At that time, the wives of lecturers did not work and were dependent on their husbands. The Fund provided for widows in the event of their husband's death by giving them half of their spouse's pension. Professor H. Malcher also worked in the administration of the mentioned Fund [23]. Sometimes the Fund was also called «Suvorov's Allowance» because the Riga Merchants' College in connection with the 25th anniversary of the former governor-general of the Baltics (1848–1861), Count Aleksandr Suvorov (1804–1882) in the state service (1875), granted 10 000 rubles to the RP Widows and Orphans Fund. In the event of H. Malcher's death, his wife Mary Malcher (?-?), whom he married in Riga, would also have received a pension. However, at the beginning of 1924, the conditions of the Fund changed. Apparently, Professor Emeritus received information about this too late, and his request to preserve the use of the Fund in the event of his death for his widow was denied [24].

Although some sources mention that the Professor was invited to work by the University of Vienna, there is no documentary evidence of such an invitation [2]. After returning to Austria, Professor H. Malcher lived in his native Kujavy Village. While still living in Riga, he had thought about his old age and bought back his brother's property in Kujavy and farmed there. As the political situation changed, he, like other RP / RPI lecturers, lost the investments and guarantees he was due. He created the first water distribution system in his native village and also built one for his neighbour's SPA. In the last years of his life, H. Malcher worked as a construction consultant and inspector. Kujavy remembers the Professor as a generous supporter of poor students and social activities. H. Malcher passed away on 9 November 1927 [2].

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The Professor had two sons and a daughter, who were born in Riga, studied in Opava and worked in the then-Austrian (currently Czech) territory.

## Conclusions

The working life of engineer professor H. Malcher was dedicated not only to Riga and its inhabitants but also to the development and well-being of the entire territory of present-day Latvia. His contribution to engineering, especially hydraulic engineering, was highly appreciated not only among colleagues and experts but also at the national level. Over the years, new engineering solutions for water extraction and sewage installation emerged. During World War I, when Kurzeme, including the city of Jelgava, was occupied by German troops, the Jelgava city water pipeline designed by engineer H. Malcher was improved by installing artesian wells according to the well-known water pipeline engineer, the above-mentioned German engineer A. Thiem's son Guenther Thiem (1875–1959) [25].

Although more than 120 years have passed since the termination of Professor H. Malcher's activities in Riga, his name is still mentioned in RTU historical studies, as he was one of the leading specialists in hydrotechnics and geodesy in the territory of present-day Latvia in the second half of the 19th century and laid the foundation for the development of these sciences.

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## SOURCES OF ILLUSTRATIONS

**Figure 1.** <https://www.kujavy.cz/slavne-osobnosti/malcher-heinrich-profesor>.

**Figure 2.** RTU Zinātniskā bibliotēka.

**Figure 3.** LNA LVVA 7175. f., 1. apr., 192. l., 90. lp.

**Figure 4.** RTU Zinātniskā bibliotēka.

**Figure 5.** RTU Zinātniskā bibliotēka.



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### **Rīgas Politehnikuma / Rīgas Politehniskā institūta profesora Heinriha Malhera (1848–1927) darbība un devums Latvijai**

Rīgas Politehnikumā (RP) tā pastāvēšanas pirmajās desmitgadēs strādāja daudz ārzemnieku, viņu vidū arī viens no starptautiski atpazīstamākajiem docētājiem un zinātniekiem ģeodēzists un hidrotehniķis Heinrihs Malhers (*Heinrich Malcher*; 1848–1927), kurš turpināja strādāt arī pēc augstskolas reorganizācijas par Rīgas Politehnisko institūtu (RPI; 1896). 20 gadu profesors bija RP / RPI Inženieru nodaļas vadītājs (1882–1902). Līdzās pedagoģiskajam darbam H. Malhers izprojektēja ūdensvadu Jelgavai (1881), vadīja Rīgas pilsētas pirmā triangulācijas tīkla izveidi, nodarbojās ar pilsētas notekūdeņu novadīšanas jautājumiem, darbojās Rīgas Tehniskajā biedrībā. Mūža nogalē viņš dzīvoja Čehijā, Kujavī ciematā, kur izveidoja pirmo ūdens sadales sistēmu un strādāja par celtniecības konsultantu un inspektoru.

**Atslēgvārdi:** Rīgas Politehnikums, Rīgas Politehniskais institūts, Heinrihs Malhers, ūdensapgāde.