Jerzy HICKIEWICZ,

Politechnika Opolska (1),

100th anniversary of the foundation of the Subfaculty of Electrotechnics at the Lwów Technical University *(Politechnika Lwowska)*

Abstract. *This paper describes the origins of technical higher education in nineteenth-century Europe. Some attempts at founding Polish technical universities on the Polish territory annexed by other countries are presented, as the factors which finally led to the establishment of the Technical University in Lvov, the only one university at this time, in which, under the Austrian emperor's decree dated 4 September 1870, instructions were in Polish. Described is the history of the Subfaculty of Electrotechnics at this university and its development since the foundation in 1911, as well as the promotions of their professors. We also learn about the electrotechnical subfaculty during the Second World War and what happened to its professors afterwards.*

Streszczenie. *W opracowaniu omówiono tworzenie się technicznego szkolnictwa wyższego w dziewiętnastym wieku w Europie. Przedstawiono też powstawanie technicznych szkół wyższych na terytoriach Polski, w okresie rozbiorowym, w tym Akademii Technicznej we Lwowie, jedynej z polskim językiem wykładowym, wprowadzonym dekretem cesarskim z dnia 3 września 1870 roku. Przedstawiono historię powstałego w 1911 roku Oddziału Elektrotechnicznego, w tej uczelni i sylwetki kolejnych jego profesorów. Omówiono losy Oddziału w okresie drugiej wojny światowej i jego profesorów po tej wojnie.(**100-na rocznica utworzenia Oddziału Elektrotechnicznego Politechniki Lwowskiej).*

Keywords: History of electrotechnics, Technical University in Lvov, Subfaculty of Electrotechnics, 100th anniversary of the foundation
Słowa kluczowe: Historia elektrotechniki, Politechnika Lwowska, Oddział Elektrotechniczny, 100-lecie utworzenia

The progress in mathematics, physics and chemistry during the 18th century and the advancing combination of technical knowledge with science created the demand for the new form of technical education. The academic scientists of that time were showing interest in the new technical inventions. Simultaneously the first technical schools, usually limited to one discipline, were being set up for the military purposes mainly.

The first civil technical university was the Central School of Public Works founded in Paris in 1794. In 1795 it was renamed ~~as~~ the Polytechnic School (fr. *École Polytechnique*, derived from Greek *polytechnos* – skillful in many trades). It soon proved to be the school of great renown, with such remarkable names among its professors like Andre Ampere, Saudi Carnot, Louis Gay-Lussac, Joseph Lagrange, Pierre Laplace, Andre Legendre, Gaspar Monge. Since that time the technical schools are called the polytechnic schools.

The model of *École Polytechnique* was the base for the Prague Polytechnic (with German as a language of instruction), founded in 1806 as a second technical school in Europe. In the following years other polytechnic schools across the Europe were set up: Vienna (1820), Glasgow (1824), London (1825), Karlsruhe (1825). Worth mentioning from among polytechnic schools that were set up later on are: the Darmstadt Polytechnic (1838; where Michal Doliwo-Dobrowolski was active and whose students were Aleksander Rothert, Kazimierz Lutoslawski, Stanislaw Odrowaz-Wysocki, Mieczyslaw Pozaryski, Gabriel Sokolnicki, Kazimierz Drewnowski, Wlodzimierz Krukowski), Zurich (1854; Gabriel Narutowicz), Budapest (1857), Riga (1962), Kiev (1898), Petersburg (1899), Brno (1899), Gdansk (1904) and Wroclaw (1910).

When it comes to Poland, 1816 saw the foundation of an academic technical school, the Mining Academy in Kielce (on the Polish territory annexed by Rusia), with Stanislaw Staszic playing the crucial role in its foundation. The school was later relocated and merged into The Preparatory School for the Institute of Technology, founded in 1826 in Warsaw. The ultimate purpose was to transform this entity into the Polytechnic Institute, but the Russian repressions following the failure of the November Upraising resulted in disbanding the school, among many other institutions. The present Warsaw University of Technology (or Warsaw Polytechnic, *Politechnika Warszawska*), itself being set up in 1915, cultivates the traditions of the Preparatory School. The next initiative was the founding of the Institute of Technology in 1836 in the Free City of Krakow, which was transformed into the secondary school in 1848 following the forced annexation of the Free City into the Austrian Empire. Afterwards it was not until 1919 when Krakow could see the foundation of the academic school of technology with Polish as the language of instruction, namely the Academy of Mining. Back under the Russian rule, in 1862 the Polytechnic Institute was founded in Puławy. But just after a few months of activity it was closed due to the outbreak of the January Uprising.

Then it was not before the end of the 19th century, when the public fund-raising (3.5 million rubles earmarked for the creation of four university buildings in Warsaw) allowed for the foundation of the Emperor Nicolas II University of Technology in 1898. The Russian authorities had enforced the Russian as the language of instruction but also the staffing of the teaching body with Russians. During the unrest resulting from the 1905 Russian Revolution the University was temporarily closed. But it was the German authorities during the First World War in 1915 who permitted the use of Polish as the language of instruction in order to gain support for the German cause among the Poles.

But it was in Lwow, then under the Austrian rule, where the first longer lasting university of technology with Polish as the language of instruction was founded. The beginnings date to 1844, when the Technical Academy Lemberg (Lvov) was created on the basis of the technical secondary school. At first German was the official language of instruction. But following the political change in Austrian Empire in 1870 it was replaced with Polish. Also then the Academy was granted with rights to pass its own statutes and staff the faculties independently. In 1872 the Academy was granted with the full academic status, with its own elected senate and rector. Feliks Strzelecki was elected as the first rector. The Academy had three faculties at the time: Land Engineering, Architecture and Technical Chemistry.

In 1874-77 the main building and the building of the faculty of chemistry were added to the premises of the

Academy. The buildings were constructed basing on the design of Julian Zacharewicz (the future rector of the Academy). The main building has the richly-ornamented stairway and the hall painted with allegorical images symbolizing the mankind's major technical inventions. In 1875 the fourth faculty, the machine design was set up. In 1877 the Academy was renamed the Polytechnic School.

Photo 1. Main Building Frontage of Politechnika Lwowska designed by Julian Zachariewicz, built in 1877 (contemporary state)

Photo 2. Fragment of a staircase in the main building. Paintings of M. & E Flek brothers, after drawings of J. Zacharewicz

Photo 3. Fragment of main hall ornamented with 11 allegorical paintings designed by Jan Matejko (1880)

Below are the major events in the history of the Polytechnic School related to the electrotechnics :

1889/90: The machine design faculty introduces the lectures on electrotechnics by a lecturer Franciszek Dobrzynski. At the beginning there is only one hour lecture a week; the covered subjects are dynamo-electric machines, electric lighting, electric transmission.

1890/91: The first Polish General Electrotechnics Department is set up. It is first headed by Roman Dzieslewski, who is also then promoted to associate professor. Roman Dzieslewski graduated with honors from the Mechanics

Photo 4. One of the main hall pictures symbolising invention of telegraph. Discovery of electricity gives the men new possibilities. The picture symbolise cable which connected two continents. Woman on right epitomises Europe on the bull, woman on left - America symbolised by dolphin. The lightning symbolises instantaneous connection between the continents. Contrary constitutes, showed in the background, the Columb's ship slowly sailing through the troubled ocean.

Faculty of the Polytechnic School in Lwow. Apart from that, he also took three semester studies on electrotechnics faculty of the Technical University Berlin-Charlottenburg. He then worked in the industry and for the technical services of the Austrian naval forces. It was this wide practical experience which let him win the promotion over another candidate, Franciszek Dobrzynski, who only had the theoretical background. Roman Dzieslewski became the first Polish professor in the area of electricity. He created the first electrotechnical laboratory in the School, which was decently equipped at the time.

Photo 5. Prof. Roman Dzieślewski (1863-1924)

1909/10: The founding of the new Department of Constructional Electrotechnics (dealing with the theory and design of the electric machines, design of power plants). It

was the first Polish department of this discipline. For its first head was elected Aleksander Rothert, simultaneously promoted to the status of the full professor. Aleksander Rothert graduated in 1893 from the Faculty of Mechanics at the Riga Polytechnic. Afterwards he completed the studies on the Department of Electrotechnics at the Darmstadt Technical University under the guidance of professor Erasmus Kittler. The department, headed by Kittler, was the place where the electrotechnics of the three-phase alternating current was taking its modern shape. After the graduation, Aleksander Rothert was engaged in the research and studying of the theory and the design of the electric machines. He also took part himself in the designing of three-phase installations and the machines of the alternating current, which were emerging at the time. Afterwards he worked in many places across the whole Europe, like Frankfurt am Main, Liege in Belgium, Moscow, Scotland, Warsaw. In 1908 he left to the USA for a few months, were he was getting to know the means of managing the production plants. He was the patentee in Germany and in the USA. He published in various technical papers across Europe, like *Elektrotechnische Zeitrschrift*, *Ecairge Electrique*, Electrician, and *Przegląd Techniczny*. He was the very active member VDE (Verband Deutscher Elektrotechniker Elektronik und Informationstechnik – *German* Association for Electrotechnics, Electronics and Information Technology), he wrote books and articles on electrical machines, he was the originator of the concept of "ampere-turn". In short – he managed to gain the international renown. Later on in 1930 he became a honorary member of VBE. He was also a member of IEEE (Institute of Electrical and Electronics Engineers).

1910: Professor Rothert compiled the text-book on the theory and design of the electrical machines, which was the first book in Polish dealing with the matter, published in Lvov in 1910.

Photo 6. Prof. Aleksander Rothert (1870-1937)

1911: The efforts of prof. Roman Dzieślewski lead to the foundation of the Subfaculty of Electrotechnics [9] within the Machine Design Faculty. In the book [7] there is given an incorrect date of this event-1920.

1920: The founding of the third department within the Electrotechnics Subfaculty – the Department of Electrotechnical Measurement headed by Kazimierz Idaszewski, who had a 15 years career record at Siemens' R&D Department of Electrical Machines in Berlin. He was the first Pole to receive the doctor of sciences degree in electrotechnics, which he was granted with honors with from the Brunswick Technical University.

1920/21: The inauguration of the first post-war academic year, which didn't take place until the 10th January 1921 when the temporary military hospital was removed from the Polytechnical School's main building. The Machine Design Faculty renamed the Mechanic Faculty including the Machine Subfaculty, Subfaculty of Oil and Electrotrchnics Subfaculty The name of the school was changed on the 28th June 1921 into the Lwow Technical University (Politechnika Lwowska). Professor Aleksander Rothert moved to Warsaw. Subsequently the Department of Constructional Electrotechnics was closed down. The charge over the subject of electrical machines was taken over by profesor Kazimierz Idaszewski.

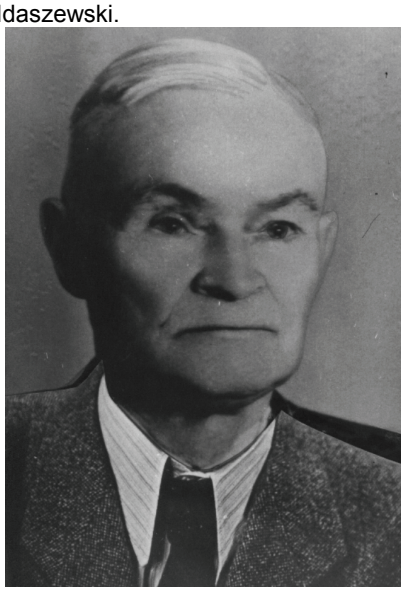


Photo 7. Prof. Kazimierz Idaszewski (1878-1965)

Photo 8. Prof Gabriel Sokolnicki (1977-1975)

1921: The founding of the fourth department – the Department of Electric Lighting (later renamed the Department of Electric Appliances). Gabriel Sokolnicki became its first head. His wide practical experience concerned the design and implementation of the electrical installations, design of power plant and means to streamline the high-voltage current.

1923: The faculty grants its first doctor of sciences degree in electrotechnics to Stanisław Fryze, with doctoral thesis on "The new theory of the general electrical circuit", professor

Ludwik Ebermann as the promoter, professor Roman Dzieslewski and professor Maksymilian Huber as reviewers.
1924: Professor Roman Dzieslewski dies on the 8th August 1924. The grave is located at the Lyczakow Cemetery and can be spotted on the left side of the main alley leading to the Lwow Eaglets Cemetary. (The ancestoral name of the family was *Zdzisławski* but was changed into *Dzieslewski* to be easier to pronounce for the Austrian authorities).

Photo 9. The tomb of family Powała Zdzisławski (Dzieślewski) on the Lyczakowski Cemetery in Lwow (state in 2007)

Photo 10. Inscription on the prof. Roman Dzieslewski tomb (state in 2007)

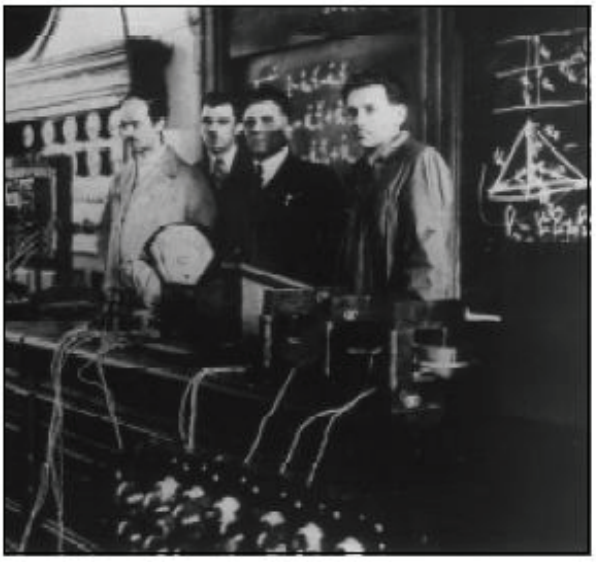
Photo 11. Prof. Stanisław Fryze (1885-1964)

1925: Professor Stanisław Fryze takes over the heading of the General Electrotechnics Department. He introduced symbolic method to the Polish electrotechnics, wrote articles to German and French technical papers, where he presented the fibular systems in the branched circuits and the theory of the electrical power.
1930: Wlodzimierz Krukowski became the full professor and the head of the Department of Electrotechnical Measurement. He had the prior career record of over 10 years at the Siemens laboratory of electric meters in Nurnberg. He was the originator of over 40 inventions in this discipline with patents in various countries. His doctoral thesis also treated this subject. Siemens manufactured over a million of electric meters using his major improvements.
1930: The founding of the department of the electrical machines with professor Kazimierz Idaszewski as its first head.

Photo 12. Prof. Włodzimierz Krukowski (1887-1941)

1937: The faculty grants its second doctor of sciences degree in electrotechnics (with honors) to Pawel Jan Nowacki, with doctoral thesis on “The new way of calculating of long-range lines by means of power graphs including in particular the closed circuits” and professor Gabriel Sokolnicki as the promoter.
1939: The faculty grants the doctor of sciences degree to Izaak Rosenzweig, with doctoral thesis on “The symbolic multidimensional vector analysis as a means to analyze multiphase systems” and professor Stanisław Fryze as the promoter.

Photo 13. Prof. Paweł Jan Nowacki (1905-1979)



Zespół pracowników
Katedry Elektrotechniki Ogólnej Politechniki Lwowskiej,
rok akademicki 1936/37

od lewej: dr inż. Izaak Rosenzweig — docent,
zginął we Lwowie w 1941 r.,
Aleksander Kaszuba — starszy laborant, późniejszy instruktor
Katedry Podstaw Elektrotechniki Politechniki Śląskiej,
prof. dr inż. Stanisław Fryze,
mgr inż. Ludwik Manz — starszy asystent, późniejszy
główny energetyk Zjednoczenia Górniczo-Hutniczego
Metali Nieżelaznych w Katowicach

Photo 14. Staff of General Electrotechnics Department in Politechnika Lwowska (1936/37). From left: Ph.D. Izaak Rosenzweig - docent, died in Lwow 1941, Alreksander Kaszuba - collaborator, later Instructor in the Department of Basic Electrotechnics of Politechnika Ślaska, prof. Stanislaw Fryze, Msc Ludwik Manz, senior assistant, later the Main Energy Specialist in a Concern of Main & Foundry in Katowice

The teaching on the Subfaculty of Electrotechnics was carried out within the four departments by a few dozens of lecturers, among them professor Ignacy Moscicki form the Faculty of Chemistry, who was dealing with some issues related to the high voltage. Ignacy Moscicki, better known as chemist, had also significant accomplishments in the area of electrotechnics. He conducted many researches and authored many patents in the areas of the high voltage and insulation techniques. He was the originator of the high voltage condensers of his own design, reffered to as the "Moscicki's condensers".

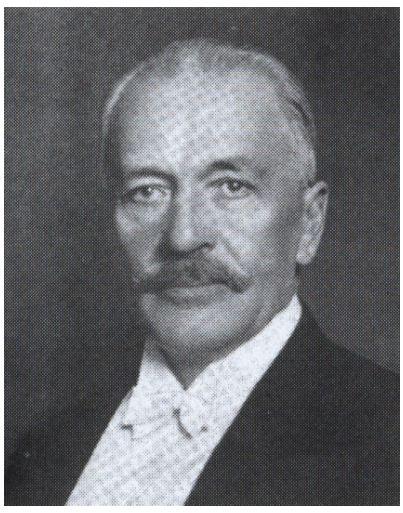


Photo 15. Prof. Ignacy Mościcki (1867-1946)

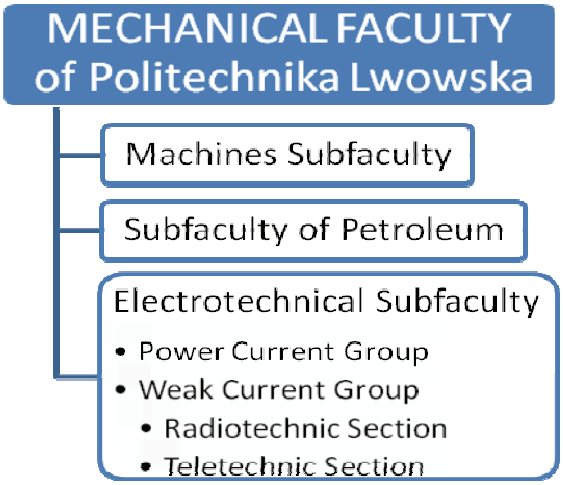
Related to the Subfaculty of Electrotechnics was the Department of Physics, located within the Faculty of Forestry and Agriculture. The Department of Physics was headed by professor Tadeusz Malarski and it provided the Subfaculty of Electrotechnics with the services in the area of radio engineering and radio technics. Tadeusz Malarski graduated in 1907 from the Mechanics Faculty of the Polytechnic School in Lwow. Afterwards he completed the math-physics studies at the University of Lwow, where he showed the particular interest with the theory of the electromagnetic waves. In 1918-21 he served in the army – first as a commander of the radiotelegraph station and in the end as the head of radiotelegraph services of the 6th army.

Photo 16. Prof. Tadeusz Malarski (1883-1952)

He received the doctor of science degree in 1920 and the postdoctoral degree in 1925. He organized the radiotelegraph laboratory on the Lwow Technical University.

Subjects related to electrotechnics were lectured by the eight successive professors, from whom the majority had the international renown due to their professional record in the industry, activity in the cross-European institutions or their publications.

It was planned to transform the Subfaculty of Electrotechnics into the separate faculty, but the outbreak of the Second World War changed the course of events.



Conclusion

Professors of the Subfaculty of Electrotechnics provided the emerging Warsaw Technical University (Politechnika Warszawska) with the needed lecturers. In 1916, when the First World War was still going, Kazimierz Drewnowski (electrical measurement, high voltage techniques) moved to Warsaw Technical University, where he created the high voltage laboratory. He was a promoter of doctoral thesis many times there, twice elected as a dean, and in 1939 as a rector. In the following years other professors moved to the Warsaw Technical University for example Wacław Günter in 1917, Aleksander Rothert in 1920, where he in 1925 received honorary doctorate. Aleksander Rothert was also involved in the subject of logistics and managing the workforce and became the lecturer on the Warsaw School of Economics. And in 1926 one of the professors, Ignacy Mościcki, became the President of Poland.

In 1939, after beginning of the occupation of Lvov by Soviet army, the Department of Radiotechnics was established at the Lvov Technical University. In charge of it was Professor Janusz Groszkowski, who came from Warsaw Technical University. In this department Tadeusz Zagajewski, who in 1936 had graduated with honors from Subfaculty of Electrotechnics at the Lvov Technical University, began to work as an assistant. He was giving lectures and classes on the subject of radio broadcasting devices. He was continuing this work after re-entry of Soviets to Lvov in August 1944. In October 1945 T. Zagajewski moved from Lvov to Gliwice. In 1946 he received with honors the doctor of science degree from the Warsaw Technical University, with Professor Janusz Groszkowski as a promoter. Professor Tadeusz Zagajewski was a creator of the specialization of industrial electronics in Poland. He was the first dean of the Faculty of Automation and one of the most eminent professors of the Silesian Technical University. His first graduate was Professor Stefan Wegrzyn, and his first PhD student was Stanislaw Malzacher.

Photo 17. Prof. Tadeusz Zagajewski (1912-2004)

When Lwow was under the Nazi German occupation during the Second World War, many prominent professors and scientists were murdered in 1941 on the orders of Heinrich Himmler, chief of the Gestapo. [10] Among them there were 25 professors of the University of Jan Kazimierz and Technical University of Lvov., with their families. The mass murder of 40 people was executed on the night of 3rd / 4th July 1941 on the Vuletsky Hills. Related to the Subfaculty of Electrotechnics among the murdered were profesor Wlodzimierz Krukowski, Izaak Rosenzweig Ph.D and senior assistant Eustachy Stozek.

Photo 18. Memorial on Wuleckie Hill perpetuating the events of 3-4 July 1941 night

Soviet authorities renamed the Lvov Technical University to the “Polytechnical Institute” where profesor Gabriel Sokolnicki was the head of the Department of Powerplants and Electrical Systems. In 1949-58 he was a promoter of 5 doctorate thesis.

Lecturers and graduates of the Subfaculty of Electrotechnics of the Lwow Technical University played the significant role in the reopening or founding the new academic centers in Poland after the Second World War. For example:

Gliwice: Stanislaw Fryze (theory of the electrotechnics), Tadeusz Malarski (physics and radio engineering), Tadeusz Zagajewski (industrial electronics), Andrzej Kaminski (electroenergetic systems), Franciszek Szymik (ecelctrical networks), Antoni Plamitzer (electrical machines; later in Opole).

Gdańsk: Kazimierz Kopecki (power engineering), Łukasz Dorosz (radiotechnics), Zbigniew Wojnarowski (environment protection), Zenon Jagodziński (radio navigation, hydro acoustic),

Kraków: Jan Barzyński (power networks and devices), Władysław Kołek (electrical machines), Stanisław Kurzawa (theory of electrotechnics).

Łódź: Stanisław Dzierzbicki (electrical devices), Bronisław Sochor (electrothermics).

Poznań: Bolesław Bielecki (electric power), Artur Metal (electrical measurements), was also active in Wrosław and Szczecin.

Wrocław: Wacław Guenther (electricity and electrical devices), Wojciech Fuliński, Jarosław Kuryłowicz (electrical measurements), Andrzej Jellonek (electronic metrology), Kazimierz Idaszewski, Paweł Jan Nowacki, Andrzej Kordecki (electrical machines), Roman Kurdziel (theory of electrotechnics), Konstanty Wołkowiński (electrical devices), Zbigniew Siciński (electrical technology).

In the time when the technical higher education was emerging, the Lwow Technical University was one the first in Central Europe. In the years 1870-1915 it was also the only one technical university with the Polish as a language of instruction. Its significance was nationwide, as it grouped

the Poles from all parts of Poland (then divided then between Russia, Germany and Austria). For instance, of the six successive department heads of the Subfaculty of Electrotechnics only two were born in the Austrian section of Poland, three of them in the Russian section and one in the German section of Poland.

The staff coming from the Subfaculty of Electrotechnics (about two dozens of professors and many other scientists and lecturers) played the substantial role in the reopening and founding of the academic centers in Poland after the Second World War.

In 2004 the 160th anniversary of the foundation of the Lwow Technical University was celebrated. Rectors of all Polish Technical Universities were invited and took part in the celebrations.

On 9th and 10th October 2009 about 20 members of the General Board of the Association of Polish Electrical Engineers (SEP) took part in the away meeting held in Lwów to celebrate the 90th anniversary of the association, as Lwów had been one of the six cities where the initial branches of the association had been set up. The meeting was held in the main hall of the historical building of the Lwow Technical University (*Politechnika Lwowska*). It was also attended by the professors of the current Ukrainian TU *Lwiwska Politechnika* and members of the Ukrainian Association of Electrical Engineers.

On the 13th October 2009 in Radom, the city where professor Włodzimierz Krukowski was born in 1887, was held the seminar to commemorate his achievements. The seminar was attended by professor Orest Iwachiw, who now heads the chair which way back was headed by professor Krukowski, and by professor Michal Geraimczuk from the Technical University of Kyiv.

On 13th to 16th May 2010 was held the 20th convention of deans of Faculties of Electrical Engineering from the Polish Technical Universities which was being organized by Technical University of Lublin. The meeting was held first in Lublin and then in Lwów, in the historical building of the *Politechnika Lwowska*, in its main hall.

Basing on the case of the electrotechnics it can be assumed, that the Lwow Lwow Technical University played the crucial role in the emerging of the higher technical education in Poland, and perhaps in the Ukraine. The person bringing these two issues together, as far as electrotechnics is concerned, may be professor Gabriel Sokolnicki, who worked in both – Polish and Ukrainian Lvov Technical University.

SOURCES

[1] Zbigniew Siciński: *Wkład Politechniki Lwowskiej w Polską Elektrotechnikę*, Wrocław, Zakład Narodowy im. Ossolińskich, Wyd. PAN 1991 r.

[2] Praca Zbiorowa (Robert Szewalski - przew. kom. red.): *Politechnika Lwowska 1844-1945*. Wyd. Politechniki Wrocławskiej 1993 r.

[3] Józef Szymczyk: *O fenomenie Politechniki Lwowskiej - matki polskich politechnik w 160 lecie jej powstania (1844-2004).* Energetyka, grudzień 2004 r., str. 762-769.

[4] Jerzy Hickiewicz: *Historia Oddziału Elektrotechnicznego Politechniki Lwowskiej z perspektywy jej 169-lecia*. Przegląd Elektrotechniczny. R 84 NR 4/2008 str. 148-149.

[5] *Nacjonalny Uniwersytet „Lwiwska Politechnika*": Zbiór pocztówek Photo 2, Photo 3 i Photo 4.

[6] Prywatne zbiory Krzysztofa Tomczewskiego Photo 1 i Photo 17.

[7] Praca zbiorowa pod red. Jerzego Hickiewicza: *Polacy zasłużeni dla elektryki*. Wyd. PTETiS Warszawa, Gliwice, Opole, 2009 r. str. 15-21.

[8] Jerzy Hickiewicz: Początki elekrtotechnicznego szkolnictwa wyższego w Polsce- Politechnika Lwowska Wiadomości Elektrotechniczne, nr 10, 2009 r, str. 50-54

[9] Leon Staniewicz: Nauki Elektrotechniczne, Dziesięciolecie Polski Odrodzonej, Księga Pamiątkowa 1918-1928, wyd. i nakład IKC, Kraków–Warszawa 1928, str. 626-628.

[10] Zygmunt Albert: Kaźń Profesorów Lwowskich Lipiec 194, wyd. Uniwersytetu Wrocławskiego 1989

Autor:
Dr hab. inż. Jerzy Hickiewicz, Profesor P. O., Politechnika Opolska, Instytut Układów Elektromechanicznych i Elektroniki Przemysłowej, j.hickiewicz@po.opole.pl

Translation from the Polish version of this paper *Maciej RĄBALSKI.*