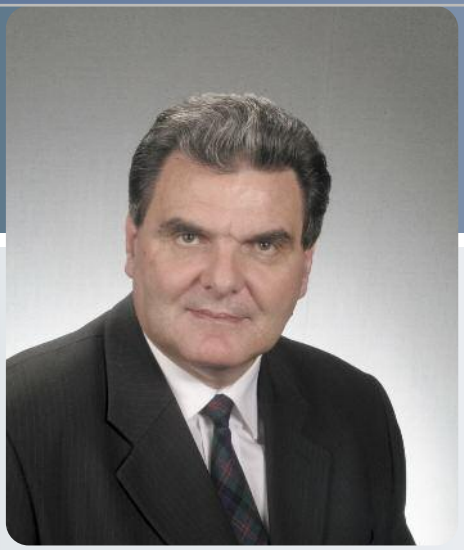
Editorial



Since ancient times till nowadays materials have been the basis of the civilisational progress of humanity and in such a distant horizon of many thousands years of history of human civilisation one can talk about the development of materials engineering, as a component of the development of the material culture of humanity, though the name and the paradigm of a scientific discipline were found only around half a century ago. A special meaning of materials as a carrier of civilisation results from the fact that they increase the access of a man to other sources of human civilisation, mainly energy (including food), and information. They are material to make useful products for people - from tools and weapons, ornaments, objects of worship and works of art, the machinery and equipment, buildings and engineering structures, vehicles and means of communication, electronic microcircuits and computers during millennia. The appearance of those products is closely related to the progress in the field of materials in the successive phases of development of those materials that is natural ability, craftsmanship, engineering inventions, scientific discoveries. The development of materials in the subsequent phases are accompanied by huge social, economic, cultural and civilisational changes. Area of knowledge, dealing with those issues is materials science and engineering. Materials science is a field of science dealing with structure and properties of materials, especially with regard to the possibility of their use. Materials engineering is a field of engineering including the application of materials science for directly useful purposes connected with designing, manufacturing and use of various products and consumer goods. The main goal of engineering materials is to work out and select materials for specific applications with the use of cognitive and technical achievements relating to the internal structure of materials. The essence and mode of activity of materials science is connected with materials usefulness for a proper application and is described with the group of relations among manufacturing, structure and properties. A proper material selection is based on the group of required properties, regardless of the type of materials such as metals, ceramics, polymers or composites. The scope of interest of materials engineering includes several complementary and large groups of interests. Synthesis and processing of materials concerns the arrangement of atoms and the components of a larger scale in materials in the systems with the required configuration. The chemical composition and microstructure of materials include an assessment of the impact of chemical composition and microstructure on the behaviour of materials. Phenomena and properties of materials are connected with researches of mechanisms taking place in materials during the technological processes and operations in order to explain phenomena and their effects on properties of materials. The behaviour of materials in operating conditions includes an assessment of the suitability of materials for different applications. Materials design and the prediction of their durability and/or vitality requires prediction of chemical composition, properties and durability of materials in the operating conditions by the use of theoretical methods and with computer assistance including artificial intelligence methods. In all mentioned areas there has been a rapid progress, which is measured by avant-garde technical achievements including space flights and numerous awards with the Nobel Prize, awarded in connection with the discovery of new materials or their properties.

The answer to the simple question, when materials science has begun, as an independent scientific discipline, however, faces big problems. Most probably because the name of this discipline came into being only in the late 1950s and 1960s in the USA and within the next two decades, has spread in many other countries, among others in Europe, including Poland. In Poland, the studies for a degree in materials engineering were started for the first time in 1971 at the Faculty of Metallurgy of the Silesian University of Technology in Katowice and the Faculty of Ceramics of the AGH University of Science and Technology in Cracow, and two years later in the present Faculty of Materials Engineering of the Warsaw University of Technology. Among others: Professors – Professor S.T. Jaźwiński who arrived from the USA after a long-term research scholarship, Professor Adam Gierek, Professor Adolf Maciejny, Professor Tadeusz Lamber, Professor Roman Pampuch and Prof. Stefan Wojciechowski belong to the initiators of those activities.

However, the development of materials engineering as a scientific discipline dates back much earlier and has a close relationship with the development of higher education both in Poland and in Europe. In each of the newly founded technical University material issues have been not omitted, which is obvious, since the production of any product satisfying human expectations which requires, and always has required the use of relevant material and since the beginning among others students of technical universities have been taught about it. That is why analysing the development of technical higher education, one must bear in mind that it became a part also of the development of materials science in the modern sense of this discipline, though, for obvious reasons this definition has not been used previously.

In the16th century scientists and artists showed their interest in technical output, and Leonardo da Vinci is considered to be a precursor of technical sciences. In the 17th century academics became interested in scientific achievements and technical schools, specialised, usually in one field started to be opened for the need of the army. In the artillery school found in 1682 in La Ferein, France a term "engineer" was created, although civil construction and architecture schools were founded respectively in 1577 in Rome, in 1671 in Paris and in 1692 in Vienna. In 1701 at the University of Prague the first in the world Engineering Department was opened, and with time the next departments of mechanics and technology were created in Halle, Prussia in 1722 and in Frankfurt (Oder) in 1727. The development of technical universities was possible thanks to improvements of military and civil universities. In the 18th century in several European countries next military universities with technical programme were founded, including ones in Petersburg, Russia in 1701, in Berlin, Prussia in 1705, in Vienna, Austria in 1717, in Wiener Neustadt in1725, in Budziejowice in 1744 and in several places in France, what was accompanied by analogous development of civil schools, within those specialised in one field, for example of road and bridge constructions, of mining and the central school of arts and handcraft with departments of mechanics, chemistry, mining and constructions. It became a model for the creation of the next European civil universities as for example

a mining academy in Saxony in 1765 in Freiberg, in Russia in 1775 in Petersburg, in Austria in Schemnitz (Banska Stiavnica in Slovakia) in 1770. In Germany simultaneously "realschules", providing with handcraft education at the secondary level were founded, including ones created in1706 in Halle, in 1745 in Braunschweig, in 1747 in Berlin, and later in Austria in Vienna in 1771. After the French Revolution in 1794 in Paris the Central School of Public Works, later renamed in 1795 to a Polytechnic School and which gave its graduates the opportunity to specialise at civil or military technical universities, was created. The system of connections with universities specialised in one field has survived in Paris Polytechnic School till today, but excluding the name, it has not caught on in Europe. Successively founded European polytechnics adopted a concept of studies in many fields and in times shifted to educating in separate faculties, what was initiated by the Swiss - in 1845 Ferdinand Redtenbacheras the head of a polytechnic in Karlsruhe and in 1855 a Polytechnics in Zurich - and in time most of the technical universities called Polytechnics as well as technological institute in Russia. After the one in Paris, polytechnics were successively founded in Prague (1806), Vienna (1815), Glasgow (1820), London (1824), Karlsruhe (1825), Warsaw (1826-1831), Munich and Stockholm (1827), Dresden (1828), Goteborg and Copenhagen (1829), Kassel (1830), Hanover (1831), Stuttgart (1832), Augsburg (1833), Braunschweig (1835), Athens and Liege (1836), Mons (1837), Darnstadt (1838), Madrid and Delft (1842) and finally in 1844 in Lvov. Next polytechnics were founded in following years in many other places. During 1772 Lvov stayed under the Austrian rule. The tsarist decree dated 4th October 1870 introduced Polish as lecture language. The 20th century brought that the this great University was in its heyday till 1918 within the framework of Austro-Hungarian Empire, but also within the Polish autonomy, from 1918 to 1939 as the greatest and best Polish University of Technilogy known as the Lvov Polytechnic University, acting in Poland except the Warsaw University of Technology and the newly created in 1919, the AGH University of Science and Technology in Cracow.

At the end of the 19th century metal science researches were intensified in the USA and Japan. In 1903 H. M. Howe published the dissertation on Iron Steel and Other Alloys in Boston considered as the first textbook of metallurgy in the world. In Poland in the inter-war period the three centres of research and knowledge of metallurgy and metal science were founded in the technical universities in Warsaw, Cracow and Lvov. The first lectures in metallography in the territory of Poland were given in 1914 at the Lvov Polytechnic University by Professor Witold Broniewski (1880-1939), a PhD student of Professor Henri Louis Le Chatelier at the Sorbonne. In 1920-1939 Professor W. Broniewski was a head of the Department of Metal Technology at the Faculty of Mechanical Engineering of the Warsaw University of Technology. In his rich output published in French and Polish, there is among others the first Polish textbook of metallurgy and metal science *Principles of metallography* (1921). Issues of metallurgy and metal science in the practical application were taken up at the Lvov Polytechnic University by Professor Stanisław Anczyc (1868-1927), a head of the Division of Mechanical Technology of Metals. In 1917-1928 Professor Stanisław Anczyc's books entitled: *Metallographical Researches in Practical Application* (1917), *Iron* (1923), *Steel Hardening* (1926), *Technological Metal Alloys* (1928) were published. In 1922 Professor Iwan Feszczenko - Czopiwski took up the issues of metal science in the AGH University of Science and Technology in Cracow, founded in 1918. In 1928 he published the first volume of three-part modern textbook entitled *Metallurgy*. In 1929 at the Faculty of Chemistry of the Warsaw University of Technology the Department of Metallurgy and Metal Science was founded. Professor Jan Czochralski (1885-1953), who became world-famous yet before 1918 thanks to the outworking of the method of obtaining monocrystals, became its head.

The time of World War II was very tragic times, and many students and professors of Lvov Polytechnic University lost their freedom, and very often even lives. In 1945 after the official end of the World War II, as a result of Tehran and Yalta Agreements the majority of Polish professors and students left Lvov and the Lvov Polytechnic University was taken by the Soviet Union. Professors from the Lvov Polytechnic University emigrated to the post-war Polish territory, stopping to concentrate in four areas, namely in Cracow, Gliwice, Wrocław and Gdańsk, where they became the core of the new Polish technical universities established there and moving there the traditions of the Lvov Polytechnic University. This impact is probably the strongest one at the Silesian University of Technology in Gliwice.

In 1945, after the war, the effort of the reconstruction of metal science education at Polish universities was taken by the alumni and associates of the outstanding Polish metal scientists of the interwar period. Of course it applies also to the Silesian University of Technology. Simultaneously Professor Kornel Wesołowski (1903-1976) fulfilled this task at the Warsaw University of Technology and the School of Engineering in the name of Wawelberg and Rotwand, in the AGH University of Science and Technology in Cracow it was done in turn by professors: Aleksander Krukowski (1894-1978), Władysław Łoskiewicz (1891-1956) and Zygmunt Jasiewicz (1897-1966), in the Łódź University of Technology - Professor Zofia Wendorff (1906-1991). Research activity in the field of metal science focused primarily in universities of technology and AGH University of Science and Technology in Cracow was significantly broadened and enriched together with the foundation of the Institute of Metallurgy (1945) transformed after a few years into the Institute of Ferrous Metallurgy, which had outstanding contribution to the development of design, research and implementation of new steel alloys and which direction was initiated by Professor Tadeusz Malkiewicz (1904-1981), a director of the Institute in the post-war years and the author of a unique textbook on Metallurgy of ferrous alloys and then many-year professor of the AGH University of Science and Technology in Cracow. In the research activities in that field the Institute of Foundry in Cracow (1951), the Institute of Non-Ferrous Metals in Gliwice (1952), the Institute of Fundamentals of Metallurgy of the Polish Academy of Sciences (1977) which were successively foounded and subsequently many of the next unites acting in the field of materials science participated.

The Silesian University of Technology in Katowice, initially with a temporary seat in Cracow, and after a few weeks in Gliwice, which was considered as a permanent seat of the University only in 1947, as it remained to this day, was created by the Polish National Council's decree 65 years ago, on 24th May 1945, a few weeks after the end of the World War II. After the end of the World War II Gliwice was placed under the Polish administration according to the 1945 Potsdam Conference. Most of the German population, which dominated in the city yet before the Word War II was forcibly expelled as stated by the Potsdam Conference and replaced with Poles, who arrived mainly from the eastern territory of the pre-war Poland, which were taken by the Soviet Union. Gliwice is a city in Upper Silesia in southern Poland, near Katowice as the part of the Silesian metropolitan area, which has a population of about 5.3 million people. The city is located on the Kłodnica river. Gliwice was first mentioned as a town in 1276 and was ruled during the Middle Ages by the Polish Silesian Piast dukes. During the reign of Mieszko I Tanglefoot, at the turn of the 1st and 2nd millennium, the town was a part of a duchy centered on Opole-Racibórz, and became a separate duchy in 1289. According to 14th-century writers, the town seemed defensive in character and was ruled by Ziemowit of Bytom. The town became a possession of the Bohemia crown in 1335, passing with that crown to the Austrian Habsburgs in 1526. During the mid-18th century

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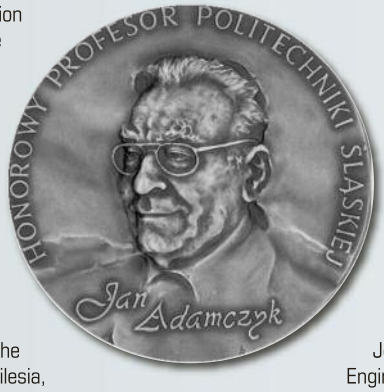
Silesian Wars, Gliwice was taken from Austria by the Kingdom of Prussia along with the majority of Silesia. The city was incorporated with Prussia into the German Empire in 1871 during the unification of Germany. Gliwice was the centre of the mining industry of the Upper Silesia. It possessed a royal foundry, with which were connected machine factories and boilerworks. Other industrialised areas of the city had other foundries, meal mills, and factories producing wire, gas pipes, cement, and paper. After the end of the World War I, clashes between Poles and Germans occurred during the Silesian Uprisings. Seeking a peaceful solution to the conflict, the League of Nations held a plebiscite on 20th March 1921 to determine which country the city should belong to. In Gliwice 78.7% of given votes were for remaining in Germany, Poland received 21.0% votes. This prompted the Third Silesian Uprising, which then forced the League of Nations to arbitrate. It determined that three Silesian towns: Gliwice, Zabrze and Bytom would remain in Germany, and the rest of Upper Silesia with its main town of Katowice would join restored Poland. An attack on a radio station in Gliwice on 31st August 1939, staged by the German secret police, served as a pretext for Nazi Germany to invade Poland, which marked the start of the World War II. The Gliwice Radio Tower of Radio Station Gliwice is today the only remaining radio tower of wood construction in the world, and with a height of 118 metres, is the tallest remaining construction made out of wood in the world.



Since the foundation of the Silesian University of Technology in 1945 the Department of Physical Metallurgy, as one of dozens or so of four faculties of the University existing at that time, directed for nearly 25 consecutive years by Professor Fryderyk Staub (1899-1982), who came from Lvov and later became the Dean of the Faculty of Mechanical Engineering, and Doctor Honoris Causa of the Silesian University of Technology, began its activity. It was the beginning of development of materials engineering in Silesia, although in a very limited range. Since the beginning of the Faculty specialists in the field of physical metallurgy, in turn in foundry, welding, polymers processing and materials engineering have been educated in turn in the following branches of studies: Mechanics and Machine Building, Automation and Robotics, Computer Science and Technical Education and Management and Production Engineering. For over 30 years the Faculty of Mechanical Engineering of the Silesian University of Technology has had full academic rights to confer PhD and DSc titles in the discipline of"Materials Engineering". Subsequently education in Materials Engineering was organised at other Silesian Universities, including the Częstochowa University of Technology in Czestochowa, the University of Silesia in Katowice and the University of Bielsko-Biała. Currently, the branch of studies: Materials Engineering is carried out in Poland at 27 faculties in 21 universities, including 13 at the universities of technology, four at universities, and one in a school of higher education and two private schools. On 1st October 2009 the group of those units was also joined by the Faculty of Mechanical Engineering of the Silesian University of Technology when the studies at 2 macro-branches of studies based on the education standards of"Materials Engineering" were started. On 1st October 2010, in the year of 65 years of the foundation of the University, students at the branch of Materials Engineering were enrolled for the first time. Among the graduates of the Department of Physical Metallurgy, and then of the Institute of Physical Metallurgy and Welding, and then of the Institute of Physical Metallurgy, directed successively by Professor Łucja Cieślak, Professor Jan Marciniak and Professor Jan Adamczyk, the later Honorary Professor of the Silesian University of Technology and finally of the Institute of Engineering Materials and Biomaterials of the Faculty of Mechanical Engineering of the Silesian University of Technology, from its foundation in 1997 led by Professor Leszek Adam Dobrzanski, multi Doctor Honoris Causa, and for 9 year the Dean of the Faculty of Mechanical Engineering of the Silesian University of Technology, there are many distinguished representatives of science, including many professors. One of the most outstanding of them and who to the last days of his life worked at the Faculty of Mechanical Engineering in 1958-2007, is the late Professor Jan Adamczyk, a Honorary Professor of the Silesian University of Technology, a leader of the Scientific School of Physical Metallurgy and Electron Microscopy at that Faculty, associated with the thematic scope by thousands of graduates of the Faculty and many representatives of science in the country and abroad, not less than the late Professor Fryderyk Staub, Doctor Honoris Causa of the Silesian University of Technology, an initiator and a leader of researches in the mentioned field in Silesia. Undoubtedly both of them represented since the beginning,"Materials Engineering" in the modern sense of this scientific discipline, although the name of this discipline, and even the discipline itself, especially in Poland, appeared much later.

In the year of the 65th anniversary of the activity of the Silesian University of Technology in the field of Materials Engineering and in the year of the 75th anniversary of Professor Jan Adamczyk's birthday the 16th International Scientific Conference on Contemporary Achievements in Mechanics, Manufacturing and Materials Science CAM^{3}S'2010 in the name of "65 Years of the Tradition in Materials Science and Engineering in Silesia, Poland" combined with the ceremony of unveiling of a memorial plaque dedicated to Late Prof. Jan Adamczyk was organised. In this special extended Issue of the Journal of Achievements in Materials and Manufacturing Engineering an extensive collection of invited papers prepared specially for print on the occasion of these anniversaries is included. The second part of this work will be published in the next issue also an extended one in December 2010. It is necessary to pay attention to the fact that these papers are not in any way the conference proceedings, because as a rule such papers are not published in the Journal of Achievements of Materials and Manufacturing Engineering, and their high quality is guaranteed by a review process of these papers carried out fully and as usual at least by 3 independent reviewers for each paper. I wish P.T. Readers a nice reading of the collection of this extremely valuable material, and thank PT authors sincerely for dedicating them to the memory of Late Professor Jan Adamczyk and efforts in their outworking and preparation for print.

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