

# POLISH ACOUSTICS IN THE LAST 100 YEARS - INSTITUTIONS AND PEOPLE

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## ABSTRACT

The paper presents the history of acoustic research and acoustic applications in Poland in the years 1918 - 2000. Before 1918, the Polish state was not on the map of Europe, and there were no Polish research institutions either. In the years 1918 - 1939 in independent Poland, scientific institutions were established and the industry was growing. The development of the reconstruction of scientific life was interrupted by World War II. Polish science suffered huge material and human losses. After the war, scientific life was rebuilt and the organization of scientific life has developed based on three pillars: universities and polytechnics, where scientific research as well as staff training are conducted, institutes of the Polish Academy of Sciences, where fundamental research is conducted, and institutes related to various branches of the economy, where applied research have been carried out. Acoustics is present in all these pillars.

**Keywords:** *Polish acoustics, history, institutions, people*

## 1. INTRODUCTION

The paper presents the history of Polish acoustics from 1918 until now. Before 1918, Poland was not on the map of Europe. The territories inhabited by the Polish population were divided between Russia, Germany and Austria. Opportunities for the development of science

were limited. Polish scientists worked mainly abroad. This paper presents the activities of scientific institutions and people whose main area of activity is acoustics. These are primarily universities, polytechnics and research institutes. The profiles of the leading Polish acousticians are described. The activity of associations operating in the field of acoustics, as well as companies that are active in the field of acoustics, is presented.

## 2. ACOUSTICS IN POLAND IN THE YEARS 1918-1939 AND DURING WORLD WAR II

Leonid Pimonov's (1908-2000) master thesis entitled "System of transverse recording of film sound using a mirror oscillograph" graduated at Vilnius University in 1930. This work can be considered the first scientific paper in the field of acoustics. Leonid Pimonov was scientifically active in Poland, and later in France and Lithuania.

In 1933, Marek Kwiek graduated from the University of Poznań, where he continued his scientific activity on the vibrations of the strings of musical instruments, he also dealt with the theory of acoustic resonances and noise reduction in urban areas. In 1936 he received his PhD degree at the University of Poznań on the basis of the dissertation "The relationship between the physical properties of sound and its audibility".

The problem of the harmful effects of noise has attracted the attention of authorities in many cities. On the initiative of the Ministry of Communication, the Association of Transport Companies appointed the Main Commission for Combating Noise. In 1934, noise

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measurements were carried out in Warsaw, Kraków and Vilnius.

In 1935-36, laboratories conducting research in the field of electroacoustics and telecommunications were established in Warsaw. At the National Telecommunications Institute, Eng. Tadeusz Korn constructed a talking clock used in telephony. In turn, at the National Tele- and Radiotechnical Company, MSc. Eng. Zbigniew Żyszkowski led the team constructing microphones and headphones for telephony, laryngophones and dynamic loudspeakers.

Eng. Ignacy Malecki, in the department headed by prof. Stefan Bryła at the Architecture Faculty of Warsaw University undertook research in the field of architectural acoustics.

All activities related to the construction of Universities, Polytechnics and other schools of similar status were interrupted in September 1939 by the war. Poland was occupied by Nazi Germany. All higher education institutions were closed. The organization of higher education in the underground was dealt with by the organs of the Polish underground state. Many scientists died or were murdered, and many were displaced or went abroad.

PhD Marek Kwiek, who lived in Poznań before the war, was displaced to the so-called General Government. There he was involved in the conservation of church organs and worked scientifically on organ acoustics. He conducted research in the field of musical acoustics.

At the underground Faculty of Architecture of the Warsaw University of Technology, Eng. Ignacy Malecki defended his doctoral dissertation thesis entitled "Physics of porous materials", written under the supervision of prof. Stefan Bryła, and then in 1943 he obtained his habilitation on the basis of the dissertation entitled "Propagation of sound waves in closed rooms".

Engineer Zbigniew Żyszkowski stayed in England during the war, where he worked on the construction of radar devices.

### 3. ACTIVITY IN ACOUSTICS AFTER 1945

After the end of World War II, Poland found itself in a new situation. The country suffered huge losses, both material and personal. State borders have changed. Poland lost its territories in the east. Such distinguished universities as the

Universities of Vilnius and Lviv, as well as the Lviv University of Technology were located outside Poland. In turn, the western border was moved far to the west. Wrocław (Breslau) Szczecin (Stettin), Gdańsk (Danzig) and Gliwice (Gleitwitz) were within the borders of Poland. Before the 2<sup>nd</sup> World War these cities were important German academic centers.

They started to rebuild scientific life in these areas. A large part of the academic staff rebuilt universities located before the war in Poland: in Warsaw, Poznań, Łódź, Lublin, etc. After the end of the reconstruction period, higher education and science began to develop intensively. Many new scientific institutions were established: universities and research institutes. Over time, three main directions of development were formed: universities, which conducted both scientific activity and staff training, institutes of the Polish Academy of Sciences conducting basic research activities, and research institutes related to individual sectors of the economy. In the further part of the article, we will deal with the activities of individual organizational divisions in the field of acoustics.

#### 3.1 Universities

The term "University" will be understood as institution conducting both scientific activity and educating highly qualified personnel for various areas of economic, cultural and social life, etc.

There are a few research centers in which there are large organizational units at universities (faculty, institute, department), which had the acoustics in their name and in which acoustics or its branch was the main area of scientific and teaching activities. The oldest of them was created already in 1945. At the University of Poznań, Dr. Marek Kwiek obtained his habilitation that year on the basis of the dissertation "Historic organs of the Kielce-Sandomierz region". In 1946, Marek Kwiek created the Acoustic Lab. Later, the Laboratory was transformed into Department of Acoustics. Marek Kwiek educated the staff who conducted research and educational activities in many other centers of the country. Prof. Marek Kwiek was the initiator of the establishment of the Polish Acoustic Society and the Open Seminars in Acoustics. The developing activity of Marek Kwiek was interrupted by his death in December 1962 as a result of a plane crash.

After the death of prof. Marek Kwiek, the Department and later the Institute was taken over by his student, prof. Halina Ryffert, who headed it until 1981. When the Institute was

established, it consisted of 4 departments: Electroacoustics, Room Acoustics and Psychoacoustics, Environmental Acoustics and Molecular Acoustics. In the 2010s, the Institute was renamed the Department again and it was headed by prof. Roman Gołębiewski. The structure of the Department is the same as before the Institute. The Department of Electroacoustics is headed by prof. Ewa Skrodzka, Department of Room Acoustics and Psychoacoustics - prof. Aleksander Sęk, Department of Environmental Acoustics - prof. Anna Preis and the Department of Molecular Acoustics - prof. Tomasz Hornowski.



**Figure 1.** Marek Kwiek 1913 – 1962

The second academic center with the acoustics as the subject to research is Warsaw. There are three centers with units directly dealing with acoustics: Warsaw University of Technology, where there is a Department of Electroacoustics at the Faculty of Electronics and Information Technology, a Laboratory of Vibroacoustics at the Institute of Fundamentals of Mechanical Engineering, and the Department of Musical Acoustics at the Faculty of Sound Engineering of the Fryderyk Chopin University of Music.

In 1949, the Faculty of Communications was opened at the Warsaw University of Technology, and the Department of Electroacoustics was established there. It was led by Prof. Ignacy Malecki. The Department conducted research in the field of physical foundations of acoustics and

electroacoustics, sound technology, room acoustics, as well as noise control. In the field of room acoustics, Witold Straszewicz has developed a number of acoustic projects for concert halls. After the transition of Prof. I. Malecki to a responsible position at UNESCO in Paris, Dr. Witold Straszewicz became the head of the Department. After the death of prof. Witold Straszewicz, the management of the Department was taken over in 1998 by prof. Zbigniew Kulka. Currently, the Department is headed by prof. Jan Żera.



**Figure 2.** Ignacy Malecki 1912 – 2004

Laboratory of Vibroacoustics at the Faculty of Automotive and Construction Machinery Engineering Established in the early 1980s on the initiative of prof. Zbigniew Osiński. The immediate organizers of the laboratory were PhDs (now professors) Zbigniew Dąbrowski and Stanisław Radkowski. In its activities, the Laboratory worked on reducing the noise and vibrations of hydraulic excavators and the use of vibroacoustic techniques to diagnose damage to vehicles and machines. The head of the Laboratory is prof. Zbigniew Dąbrowski. The problem of noise and vibration propagation is developing by prof. Grzegorz Klekot.

The Department of Musical Acoustics and Multimedia was established on the initiative of prof. Andrzej Rakowski at the Sound Engineering Department of the Fryderyk Chopin University of Music in 1968. The professor headed the Department for many years. Research was conducted on the perception of pitch and timbre. Over the time, the research topics were expanded to include the area of listening assessment methodology, timbre perception and its training methodology, psychoacoustics and room acoustics. The Department of Musical Acoustics and Multimedia also



conducts artistic activities. The department is currently headed by prof. Tomira Rogala, and the Department staff includes professors Andrzej Brzoska and Andrzej Miśkiewicz.

The beginnings of acoustics at the Gdańsk University of Technology date back to the early 1950s. They are related to the activities of Prof. Zenon Jagodziński. He organized the Department of Radionavigation. In 1982 the Department of Hydroacoustics was established, headed by prof. Z. Jagodzinski. After Prof. Z. Jagodzinski retirement, the Department of Hydroacoustics was headed by professor Roman Salamon. In 2003, the Department of Hydroacoustics was transformed into the Department of Marine Electronics Systems. It was still headed by Prof. Roman Salamon, and after his retirement by prof. Jacek Marszał. Currently, this unit is called the Department of Sonar Systems. The Department worked closely with the Department of Hydroacoustics of the Naval Academy in Gdynia, headed by prof. Eugeniusz Kozaczka and later by prof. Grażyna Grelowska,

Another unit was the Department of Audio Engineering. It was led by prof. Gustaw Budzyński. In 1982, the Department launched the first speciality in Poland, "Sound Engineering". In 1991, the Department was headed by prof. Andrzej Czyżewski. In 2003, the department was transformed into the Department of Multimedia Systems, which has that name of the Department to the present day. In 2012, the Audio Acoustics Laboratory was separated from the Department, and headed by prof. Bożena Kostek.

Activity in the field of acoustics is also carried out at the University of Gdańsk. It was initiated by prof. Antoni Śliwiński in 1970. Prof. A. Śliwiński was a student of prof. Marek Kwiek. Prof. A. Śliwiński established the Department of Applied Physics at the University of Gdańsk operating within the Institute of Experimental Physics. The activities of the Department included ultrasound, molecular acoustics, acousto-optics with interaction between acoustic and light waves, the physical basis of noise control and others. After Prof. A. Śliwiński retired, the management of the Department was taken over by prof. Bogumił Linde. Professor Antoni Śliwiński turns 95 in 2023. At present, experimental research in the field of acoustics is carried out at the Department of Acoustics and Nuclear Physics. It covers environmental and room acoustics, medical

applications of acoustics, as well as acoustical phonetics, phoniatrics and audiology.

The acoustic centers in Upper Silesia Region are the Silesian University of Technology in Gliwice and the University of Katowice. The Silesian University of Technology was established in 1945. In 1969, the Faculty of Mathematics and Physics was established, with PhD Aleksander Opilski as its dean. Research in the field of molecular and quantum acoustics was conducted under his supervision. The subject of acousto-optics was dealt with by the professor Tadeusz Pustelny, while research involving surface waves was dealt with by prof. Marian Urbańczyk. Research in the field of molecular acoustics was developed by prof. Eugeniusz Soczkiewicz. The topic of acoustic emission was developed by prof. Franciszek Witos. Since the early 1970s, research in the field of acoustooptics and photoacoustics has been carried out. They were led by professors Zygmunt Kleszczewski and Janusz Berdowski. These studies were also attended by Prof. Jerzy Bodzenta and doctors Roman Bukowski and Barbara Pustelny. The noise control is a separate topic dealt with by doctors M.Rocznik and R.Hnatków. The acoustics team of the Silesian University of Technology organizes annual Winter Schools: Wave and Quantum Acoustics, and Environmental Acoustics and Vibroacoustic Risks.

Research related to acoustics is conducted at the Silesian University of Technology in the Department of Measurements and Control Systems at the Faculty of Automatic Control, Electronics and Computer Science, headed by prof. Marek Pawelczyk. These studies concern various aspects of active vibration and noise reduction, as well as speech and speaker recognition algorithms.

Since 1980, research in the field of molecular acoustics has been started at the Department of Physical Chemistry at the University of Silesia in Katowice. The initiator of this research was prof. Stefan Ernst. Currently, the Department is headed by prof. Marzena Dzida.

In Krakow, the research center in the field of acoustics is the Department of Mechanics and Vibroacoustics of the AGH University of Science and Technology. Its activity is a continuation of the activity of other AGH research units. In 1952, the Department of Technical Mechanics was established. In 1972, on the initiative of Professor Zbigniew Engel, the Environmental Noise Laboratory was established. The head was prof. Zbigniew Engel.





Professor Engel was the creator of the name "Vibroacoustics". In 1993 Department of Mechanics and Vibroacoustics was created. It was still directed by Prof. Zbigniew Engel, and after his retirement - by Professor Wojciech Batko. Professor Engel built there the laboratory facilities: the building, which is the headquarters of the Department, laboratories consisting of an anechoic chamber with a volume of 1000 m<sup>3</sup>, a set of reverberation chambers with equipment, a machine diagnostics laboratory, laboratories for testing acoustic materials and vibrating structures, and others. For his activity, Professor Z. Engel was honored with the title of Doctor Honoris Causa of AGH. In later years, the Department was headed by Prof. Jerzy Wiciak. and prof. Tadeusz Wszolek. On the basis of the Department's equipment, the Technical Acoustics Laboratory was created and headed by prof. Tadeusz Kamisiński

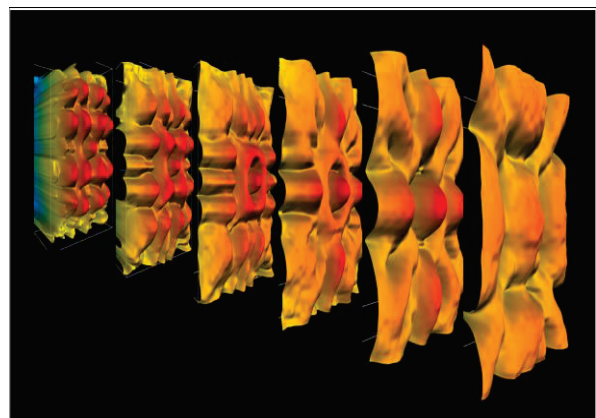
Acoustics in Wrocław is practiced mainly at the Wrocław University of Technology. The initiator of research in the field of acoustics was Professor Zbigniew Żyszkowski. He organized the Chair of Wired Telecommunication here. In 1953, he published the book "Fundamentals of electroacoustics", in which he gathered all the knowledge of the time about electroacoustic transducers. Prof. Z. Żyszkowski organized a team of young workers who in their research dealt in acoustics. The interests of doctor Janusz Renowski focused on psychoacoustics, professor Wojciech Majewski - on the speech acoustics, PhD. Edmund Talarczyk - on ultrasound technology, and PhD. Janusz Zalewski on noise control. Prof. Zbigniew Żyszkowski dealt with the problems of electroacoustic transducers. In 1968, the University was reorganized, replacing faculties and departments with institutes and research and development units. Acoustics was present at the Institute of Telecommunications and Acoustics. In the Institute were departments: the Department of Acoustics under the direction of prof. J. Renowski and the Department of Acoustic Signals Analysis and Processing headed by prof. W. Majewski. There was also the Environmental Noise and Vibration Laboratory, headed by prof. J. Zalewski. In 2012 the Department of Acoustics and Multimedia was established, headed by prof. Andrzej Dobrucki. He continued the subject of electroacoustic transducers. In 2019, Prof. A. Dobrucki retired, and the chair was taken over by prof. Krzysztof Opiełiński – specialist in the field of ultrasonic technology.

The initiator of research in the field of acoustics in

Rzeszów was prof. Roman Wyrzykowski in 1966 at the Pedagogical University. Scientific interests of prof. R. Wyrzykowski focused on the issues of analytical acoustics and the theory of vibrations. After Prof. R. Wyrzykowski retired, his work was continued by Prof. Witold Rdzanek. Now, Prof. Wojciech Rdzanek Jr. (son of Witold), together with prof. Krzysztof Szemela, continue research in the field of analytical acoustics at the Department of Biophysical and Structural Research, and prof. Lucyna Leniowska deals with active vibration damping at the Department of Mechatronics and Automation. It can also be stated that at the Rzeszów University of Technology, prof. Adam Brański is active and he specializes in numerical methods of the acoustic field, mainly the method of boundary elements (BEM). Prof. Henryka Czyż, until her retirement also worked at the Rzeszów University of Technology and dealt with molecular acoustics.

In Szczecin, from the 1970s, the Department of Applied Acoustics at the Faculty of Maritime Technology of the West Pomeranian University of Technology is operating. The acoustic research was introduced by prof. Stefan Weyna. The main area of his scientific interests was the modeling, visualization and animation of wave motion in vector diffuse and free acoustic flows. Prof. S. Weyna published several albums with illustrations of acoustic fields under the name "Shapes of sound" (see Figure 3).

At the Faculty of Electrical Engineering of the West Pomeranian University of Technology at the Department of Systems, Signals and Electroacoustics Engineering, research in the field of the electroacoustics has been carried out by prof. Witold Mickiewicz. On his initiative, the Laboratory of Acoustics and Sound Recording Technology was established.



**Figure 3.** Wavefront in the region of the square waveguide outlet (courtesy of professor Stefan Weyna)

### 3.2 Polish Academy of Sciences

The Polish Academy of Sciences (PAN) is a state institution whose task is to act for the development and promotion of science and contribute to the development of education and enrichment of national culture. On the one hand, the Academy is a corporation of scientists and creates a network of institutes and units conducting fundamental scientific research.

The network of institutes of the Academy operates within faculties which grouping individual scientific disciplines. The faculties are composed of scientific committees aggregating narrower fields of science. The committees are advisory and opinion bodies related to their areas of activity. The Committee of Acoustics operates within the Department IV of Technical Sciences. It was established in 1964 on the initiative of prof. Ignacy Malecki, who was its first chairman. The Committee is composed of 30 members. On the initiative of the Committee, the quarterly "Archives of Acoustics" was created. The first editor-in-chief was prof. Stefan Czarnecki. "Archives of Acoustics" is an international journal in which researchers from all over the world can publish. Currently, the editor-in-chief of "Archives of Acoustics" is prof. Andrzej Nowicki, who is also the chairman of the Committee of Acoustics. Within the Committee there are thematic sections: Environmental Acoustics, Molecular and Quantum Acoustics, Underwater Acoustics, Ultrasounds and Medical Acoustics and Vibroacoustics.

The proper scientific activity of the Polish Academy of Sciences is carried out at institutes. In the field of acoustics, research is conducted mainly at the Institute of Fundamental Technological Research in Warsaw. The Institute was established in December 1952. One of its founders was Professor Ignacy Malecki, who also became the first Director of the Institute. Initially, the Institute consisted of 4 departments, including the Department of Vibration Research. Later, in 1972 the Department of Analogies (head Dr. Stefan Czarnecki), the Departments of Cybernetic Acoustics (head Prof. Janusz Kacprowski), the Physical Acoustics (head Prof. Jerzy Wehr) and the Ultrasounds (head Prof. Leszek Filipczyński) were created. The Department of Acoustoelectronics was also established under the direction of Prof. Wincenty Pajewski. Currently, scientific activity in the field of acoustics is conducted

mainly by the Department of Ultrasounds, headed by prof. Jerzy Litniewski. The Department also includes professors: Andrzej Nowicki, Barbara Gambin, Tamara Kujawska and Jerzy Wójcik. The Department specializes in medical applications of ultrasound, ultrasonic microscopy and biomechanics. In the Department of Experimental Mechanics research in the field of acoustic emission are conducted by Prof. Zbigniew Ranachowski and his brother Przemysław. At the Department of Intelligent Technologies, research in the field of room acoustics is conducted by Prof. Mirosław Meissner.

### 3.3 Research institutes

Research institutes are state organizational units established by law to carry out the research tasks related to various areas of economy, culture, health and social life. Research conducted by these institutes are mostly applicable nature and their results are intended to be implemented in practice. In many institutes there are organizational units related to acoustic research.

The Central Mining Institute in Katowice contains the Environmental Engineering Center, including the Department of Acoustics, Electronics and IT Solutions. With the Department of Acoustics for many years prof. Adam Lipowczan was associated and after his retirement prof. Janusz Kompala took over his duties. The Institute conducts research related to the impact of traffic and/or industrial noise; making computer acoustic maps. The impact of mechanical vibrations transmitted through the ground on the structures of buildings and structures as well as on people staying in buildings is tested. Vibro-isolation of machines and devices is designed.

At the Central Institute for Labour Protection in Warsaw the Department of Vibroacoustic Hazards studies the harmful effects of noise and mechanical vibrations in the working environment. The Department was established in 1956 on the initiative of prof. Cz. Puzyna. The next directors were prof. Danuta Augustyńska and dr Grzegorz Makarewicz. Currently, the Department is headed by prof. Dariusz Pleban. The Department has developed stands for testing hearing protectors as well as gloves and materials for protection against vibrations. Hearing protectors with active sound attenuation and an internal communication system have been developed. Noise in classrooms and offices is being studied and means to reduce noise are designed.

Another research institute in which research in acoustics is conducted is the Institute of Environmental Protection in Warsaw. The Department of Environmental Acoustics is in the structure of the Institute. It is headed by Dr. Radosław Kucharski. The Department prepares assumptions and gives opinions on legal acts concerning the protection of the environment against noise, prepares assumptions and supervises the preparation of strategic noise maps, and gives opinions on corrective programs concerning environmental protection.

Research on health risks is carried out by the J. Nofer Institute of Occupational Medicine in Łódź. Within its structures there is the Department of Vibroacoustic Hazards headed by prof. Małgorzata Pawlaczyk-Łuszczyńska. The Department includes also the Noise and Vibration Laboratory.

The Building Research Institute Warsaw exists since 1949. In 1958, the Building Acoustics Laboratory was established. The organizer of the Laboratory and Department was prof. Jerzy Sadowski. He managed the Department until 2004, and after retiring, he handed over the management to Dr. Marek Niemas. Currently, the Department is called the Department of Thermal Physics, Acoustics and Environment. It is headed by dr Agnieszka Winkler-Skalna. It has a well-equipped research laboratory, which includes an anechoic chamber, a set of reverberation chambers for testing acoustic insulation etc. The person responsible for the laboratories is dr Elżbieta Nowicka.

#### 4. COMPANIES

One of the oldest acoustic companies in Poland was Tonsil in Września near Poznań. Tonsil was founded in 1945. It was a Polish manufacturer of electroacoustic transducers, such as loudspeakers and loudspeaker systems, microphones and headphones for home use, and telecommunication cartridges. The company experienced its greatest development in the 1970s. It was one of the largest manufacturers of loudspeakers and telecommunication cartridges in Europe. In the 1970s, Tonsil purchased a license for a complete loudspeaker production line from the Japanese company Pioneer. Tonsil loudspeakers enjoyed an excellent reputation in Poland and abroad. Now, under the name of Tonsil, there is a company that continues the production of electroacoustic transducers, but on a much smaller scale. The president is S. Wieszczeński, and Marek Dutkiewicz, an engineer from

the old experienced staff of Tonsil, is still working for the company. Based on Tonsil's staff, many small companies were established, mainly producing loudspeaker systems. One of them is APS, established in 2006 in Września. It produces professional active studio monitors. Intrada Audio, on the other hand, produces loudspeakers for home use. The president of the company is Michał Gogulski, and PhD Grzegorz Matusiak is the main designer. Another companies producing loudspeakers are Pylon S.A. in Jarocin and STX in Józefów near Warsaw.

The SONOPAN company was established in 1974 as a branch of the TECHPAN Experimental Department of the Institute of Fundamental Technological Research of the Polish Academy of Sciences. In 1992, the company transformed into an independent company SONOPAN Ltd. The company specializes in the production of acoustic measurement equipment. The flagship products are condenser measurement microphones. The company also produces microphone preamplifiers, RMS detectors and acoustic calibrators. An all-weather set for continuous monitoring of noise in cities, sound level meters and a system for measuring acoustic power are also produced. All products are original company designs. The main designer of this equipment was engineer Andrzej Bogucki.

The world-class manufacturer of sound level meters and other noise and vibration measurement equipment is SVANTEK. The company was founded in 1990 by Wiesław Barwicz and Hubert Chmieliński. The designers of the instruments were the acquired engineers Ryszard Królewski, Andrzej Podgórski and Ryszard Leoniak. The company's first product was the portable sound and vibration analyzer SVAN 910. Within 2 years, several hundred pieces of this instrument were sold. In 1995, the portable sound and vibration analyzer SVAN 912 was developed. It was a convenient and lightweight device with excellent parameters. In 2003, a new product of the SVAN 948 company entered the market. Since 2006, the company has been producing a monitoring station that enables radio transmission of measurement data. In 2012, the smallest of the meters, the SVAN 971, is produced. In 2004, the production of the SV104 acoustic dosimeter begins. In 2015, an intrinsically safe version of this dosimeter was implemented - SV104IS. In these dosimeters, for the first time in the world, measuring microphones in MEMS technology were used.

In 2009, KFB Acoustics Ltd. was established in Wrocław. It was founded by Filip and Katarzyna Barański. The company's profile includes the design and implementation of anti-noise and anti-vibration solutions in industry, as well as noise and vibration measurements both in laboratory and field conditions. The company operates both on the Polish and international markets, mainly in Germany. In addition to the main scope of activity, the company undertakes activities in the field of architectural acoustics, environment and acoustic education. The company cooperates with universities, e.g. with the Wrocław University of Science and Technology, it implements educational programs available on the Internet, such as ARAC (architectural acoustics) or ACOUCOU (acoustic course for industry). In 2023, a new company headquarters and a set of acoustic laboratories, including anechoic chambers, reverberation chambers and a dynamometer, were launched in Domasław near Wrocław. Measurement rooms are equipped with modern measurement equipment: multi-channel analyzers, specialized software.

## 5. SOCIETIES

The oldest and most important scientific society operating in all fields of acoustics is the Polish Acoustical Society. It was established in 1961 at the Acoustics Seminar in Szczecin. The group of founding members consisted of 38 people. The initiator of the establishment of the Society was Professor Marek Kwiek. The 1st Congress of the Society, during which the statute was adopted and the Society was formally founded, took place in 1963 in Poznań, after the death of prof. Kwiek. It was established that the seat of the Society was in Poznań. The first chairman of the Society was prof. Edmund Karaśkiewicz. The 1st Congress took place during the Open Acoustics Seminar (OSA), which has a 10-year longer tradition. Currently, the Polish Acoustical Society consists of 7 local branches. The branches organize OSA successively in September every year. On the occasion of OSA, the Congress of Delegates is held, which adopts the work plan for the next year. During the OSA there is a competition named after Marek Kwiek for the best work presented at OSA by young acousticians. In 2023, the LXIX OSA will be organized by the Wrocław Branch of PTA. Branches also organize their conferences including: Winter Schools organized by the Upper Silesian Branch, the Hydroacoustics Symposium (Gdańsk Branch) and the Acoustic and Biomedical Engineering Conference (Kraków). The Polish Acoustical Society is active on the

international forum: it cooperates with acoustical societies in other countries and with ICA, EAA, WCU etc. Polish acousticians were elected to the authorities of these organizations. Currently, the President of the Polish Acoustical Society is prof. Jerzy Wiciak.

Polish Section of the Audio Engineering Society (PS AES) is a part of the international AES association based in New York. The interests of the Society are to conduct research, education, standardization and exhibition activities in the field of audio engineering. The Polish AES Section was established at the 4th Symposium of Sound Engineering and Tonmeistering in Gdańsk in 1991. The initiator of the Section's establishment was prof. Marianna Sankiewicz. In addition to this Symposium, the Polish Section of AES organizes a conference every 2 years "News in Audio and Video Technology" of a more educational and practical nature. Members of the Polish Section also participate in AES Conventions and thematic conferences. The vice-presidents of the AES were: prof. M. Sankiewicz, prof. Bożena Kostek and Dr. Ewa Łukasik. Currently, the Chairman of the Polish Section of AES is Radosław Smoliński.

The League for Noise Reduction was founded in 1971 in Poznań. The first chairperson was Prof. Halina Ryffert. Among the statutory objectives of the League is to cooperate with state administrative bodies and scientific and research centers in combating environmental and human exposure to noise. This cooperation involves the organizing conferences and training, carrying out noise measurements and expert opinions, consultations, interventions, and conducting educational activities on the subject of the threat of noise. In 1979, the seat of the League was moved to Warsaw. Since 1984, the League has been entered on the list of Experts of the Ministry of Environmental Protection, which entitles it to issue assessments and opinions in the field of protection against noise and vibrations. Currently, the chairman of the Main Board is dr Mikołaj Kirpluk. Annually on April 26, the League celebrates International Noise Awareness Day.

## 6. CONCLUSIONS

The aim of the article was to introduce the international community of scientific and educational institutions, companies and societies operating in Poland in the field of acoustics.