

ANTONI WOJACZEK*[#], KAZIMIERZ MIŚKIEWICZ*SECTION OF CYBERNETICS IN MINING OF MINING COMMITTEE
OF POLISH ACADEMY OF SCIENCES – PRO MEMORIASEKcja CYBERNETYKI W GÓRNICTWIE KOMITETU GÓRNICTWA PAN
– PRO MEMORIA

Section of Cybernetics in Mining of Mining Committee of Polish Academy of Science (PAN) has been created by PAN Mining Committee in 1969. It was a section in Mining Committee of PAN, whose operation range included widely understood issues of automation, telecommunication and informatics in mining industry. The main operation method of the Section was to organize the periodic conferences dedicated to issues of control systems in mining. The first conference took place in 1971 in Katowice. Together with new (the current one) term of office of Mining Committee of PAN this Section ceased to exist. The paper presents (pro memoria) over 40 year long conference output of this Section that functioned within the scope of operation of Mining Committee of PAN up to 12th January 2016.

Keywords: cybernetics, Section of Cybernetics in Mining, Committee of Mining of Polish Academy of Sciences

Sekcja Cybernetyki w Górnictwie Komitetu Górnictwa PAN została powołana przez Komitet Górnictwa PAN w 1969 r. W Komitecie Górnictwa PAN była to Sekcja, której zakres działania obejmował szeroko rozumiane zagadnienia automatyki, telekomunikacji i informatyki w górnictwie. Głównym sposobem działalności Sekcji była organizacja cyklicznych konferencji poświęconych zagadnieniom szeroko rozumianej automatyki w górnictwie. Pierwsza z konferencji odbyła się w 1971 r. w Katowicach. Wraz z nową kadencją funkcjonowania Komitetu Górnictwa PAN Sekcja ta przestała istnieć. Artykuł przedstawia (pro memoria) ponad 40 letni dorobek konferencyjny tej Sekcji funkcjonującej w ramach Komitetu Górnictwa PAN (do 12 stycznia 2016 roku).

Słowa kluczowe: cybernetyka, Sekcja Cybernetyki w Górnictwie, Komitet Górnictwa Polskiej Akademii Nauk

* SILESIA UNIVERSITY OF TECHNOLOGY, FACULTY OF MINING AND GEOLOGY, DEPARTMENT OF ELECTRICAL ENGINEERING AND CONTROL IN MINING, 2 AKADEMICKA STR., 44-100 GLIWICE, POLAND

Corresponding author: awojaczek@polsl.pl

1. Section of Cybernetics in Mining Committee of PAN (Polish Academy of Sciences)

Polish Academy of Sciences (PAN) in present form had been created in 1952, after the first Congress of Polish Science that took place in Warsaw on the turn of June 1951. Scientists, members of PAN, create departments, committees as well as branch office of PAN. Tasks of given committee include, in particular, operation relating to significant problems of represented scientific domain as well as organizing debates and scientific conferences.

Mining Committee of PAN (KG PAN) is one of 21 committees of 4th Department of PAN technical sciences. The basic tasks of Mining Committee of PAN are, among other: organizing, co-organizing the scientific conferences as well as dissemination of their results, undertaking activities that serve for development of mining sciences as well as similar scientific domains and development of opinions, expert opinions and scientific prognoses related to mining sciences as well as multi-domain developments.

The scientific structure of Mining Committee of PAN is composed of sections that deal with various domains of science related to mining. Issues related to widely understood automation, telecommunication as well as informatics in mining were included to operation of Section of Cybernetics in Mining. Section of Cybernetics in Mining was created by Mining Committee of Polish Academy of Sciences on June 23th, 1969.

During the whole period of Section of Cybernetics in Mining the suggestions appeared to substitute the word “cybernetics” with other expression that describes the content-related scope of section operation, however, finally no decision was made to change the section name. Despite passage of 45 years as well as many suggestions to change the section name, expression “**cybernetics**”, as a very generic term, corresponded with operation activities of this section during the whole time.

Norbert Wiener is considered as a creator of modern cybernetics. N. Wiener’s work of title *Cybernetics or Control and Communication in the Animal and the Machine*, (Wiener, 1948) as well as W. Ashby’s work *An Introduction to Cybernetics* (Ashby, 1957) may be considered as classic works of cybernetics beginning. The beginning of cybernetics in Poland is connected, among other, with M. Mazur’s work (Mazur, 1976).

Norbert Wiener defined cybernetics as “the scientific study of control and communication in the animal and the machine.”

According to encyclopaedia (Collective work, 1983), cybernetic, in wider meaning, is a domain of science that deals with issues connected with control (i.e. purposeful impact to processes that provides their desired course). According to Leksykon Naukowo-Techniczny (Collective work 2001), cybernetics is a science that deals with research of generic processes of communication and control occurring in machines, alive organisms and communities. In definitions cited above, there is a concept of control both in theoretical approach and in execution method.

Usage of word cybernetics in the name of one of sections of Mining Committee of PAN represents the subject matter of interest of Cybernetics Section in Mining. The said section dealt with issues of automation, telecommunication, informatics, telemetry, monitoring the engineering processes, monitoring the power system as well as organization and management taking into consideration the environment conditions of mines.

At present, these issues are still current due to limited employment, especially in workings of increased hazard.

There were 9 sections during previous KG PAN term of office. There is 7 section in present term of office:

- Section of Mining Aerology (Prof. Ph.D. Eng., Stanisław Wasilewski),
- Section of Mining Economy and Organization (Prof. Ph.D. Eng., Marian Turek),
- Section of Rock Mechanics and Mining Construction (Prof. Ph.D. Eng., Piotr Czaja),
- Section of Mining Mechanization (Prof. Ph.D. Eng., Marian Dolipski),
- Section of Drilling and Borehole Mining (Prof. Ph.D. Eng., Stanisław Rychlicki),
- Section of Mining Technology (Ph.D. Eng., Zbigniew Kasztelewicz, prof. AGH),
- Section of Ore (Ph.D. Eng., Hubert Wirth, prof. PWr.).

The below mentioned Section was not reactivated: Section of Cybernetics in Mining as well as Section of Mineral Raw Materials Utilization.

The first chairman of Section of Cybernetics in Mining was **Professor Ludger Mirosław SZKLARSKI** from AGH (Mining and Metallurgy Academy) (1912-2003), who fulfilled this function by 27 years, until 1996 (Photograph No 1), then became a honourable member. Within 1996-1997 the function of chairman of the section was fulfilled by **Professor Florian KRASUCKI** (1928-1997) from Silesian University of Technology, Faculty of Mining and Geology, Department of Electrical Engineering and Control in Mining and since 1998 the work of Section of Cybernetics in Mining was managed by **Professor Stanisław CIERPISZ** from Silesian University of Technology, Faculty of Mining and Geology, Department of Electrical Engineering and Control in Mining.

2. Features of organised conferences

The basic task of every scientific section of Polish Academy of Science was, among other, co-organizing the scientific and technical conferences. In 2015 the section organised the last, jubilee (40th one) conference. Table 1 lists the collected by authors information about all conferences co-organised by Section of Cybernetics in Mining.



Prof. Ludger Szklarski
1969-1996



Prof. Florian Krasucki
1996-1997



Prof. Stanisław Cierpisz
1997-2015

Photograph 1. Chairmens of Section of Cybernetics in Mining

TABLE 1

List of conferences co-organized by Cybernetics Section in Mining of KG PAN together with leading subjects as well as institution who issued conference (printed) materials

Year	Location	Leading subject	Number of papers	Co-organizers / publisher
1	2	3	4	5
1971	Katowice	Automation and Cybernetics in Mining		ZKMPW ¹ / publisher ZKMPW
1973	Zakopane	Complex Automation and Engineering Processes Modelling	26	ZKMPW/ publisher ZKMPW
1974	Ustroń	Optimum Control of Engineering Processes in Mining	22	GIG ² , RZPW ³ / publisher GIG
1975	Nowa Ruda	Application of Computers in Mining		
1976	Jaszowiec	Theory and Control Engineering in Mining Work Safety Service	22	JMZPW ⁴ i EMAG ⁵ / publisher EMAG
1977	Zawoja	Telecommunication and Telemetry in Mining	23	KZPW ⁶ EMAG / publisher EMAG
1978	Szczyrk	Automation of Coal Dressing Plants	16	EMAG/ publisher EMAG
1979	Szklarska Poręba	Management and Control Systems of Mines	26	EMAG/ publisher EMAG
1980	Kazimierz Dolny	Drives Control in Mining	9	EMAG/ publisher EMAG
1981	Jaszowiec	Automatization of Transportation in Coal and Ore Underground Mining	16	EMAG/ publisher EMAG
1982	Tresna	Automatic Control and Early Detection of Hazard in Mining	20	EMAG, KWK Wieczorek/ publisher EMAG
1983	Żelazno	Theory and Technique of Transferring Information in mining	20	EMAG/ publisher EMAG
1984	Rudy Raciborskie	Progress in Automation Development of Coal Dressing Plants.	21	EMAG/ publisher EMAG
1985	Zakopane	Microprocessor Engineering in Control and Inspection Systems of Engineering Processes of Mines.	17	EMAG/ publisher EMAG
1986	Bystra	Automation Development in Mining of Nineties.	10	EMAG/ publisher EMAG
1987	Rudy Raciborskie	Automation of Mining Complexes and Transportation in Coal and Ore Underground Mines	20	EMAG/ publisher EMAG

¹ ZKMPW – Zakłady Konstrukcyjno-Mechanizacyjne Przemysłu Węglowego [Construction and Mechanization Works of Mining Industry].

² GIG – Główny Instytut Górnictwa w Katowicach [Central Mining Institute in Katowice].

³ RZPW – Rybnickie Zjednoczenie Przemysłu Węglowego [The Rybnik Union of Coal Industry].

⁴ JMZPW – Jaworznicko-Mikołowskie Zjednoczenie Przemysłu Węglowego [The Jaworzno and Mikołów Union of Coal Industry].

⁵ EMAG – Ośrodek Badawczo Rozwojowy EMAG [Research-Development Centre EMAG] and later institutions created on the base of this entity.

⁶ KZPW – Katowickie Zjednoczenie Przemysłu Węglowego [The Katowice Union of Coal Industry].

1	2	3	4	5
1988	Wysowa	Telecommunication and Telemetry in Mining	30	EMAG/ publisher EMAG
1989	Zarzeczce	Safety Parameters Inspection Systems in Mining	33	EMAG/ publisher EMAG
1990	Ustroń Zawodzie	Monitoring and Automation in Mineral Processing Plants.	17	EMAG/ publisher EMAG
1991	Rudy Raciborskie	Present Problems and Trends in Development of Automation, Informatics and Telecommunication	7	PCAMC ⁷ / (MiAG ⁸) 5/1991
1992	Jaworze	Transportation Automation in Mine	18	EMAG, PCAMC / MiAG nr 4-5/1992
1993	Zakopane	Automation of Mining and Monitoring of Safety Condition in Mine	15	EMAG, PCAMC / MiAG nr 5-6/1993
1994	Szczyrk	Informatics and Telecommunication in Mining	27	EMAG, PCAMC/ MiAG nr 5-6/1994
1995	Gliwice	XII International Conference on Automation in Mining and Quarries ICAMC'95	175	KEiAG ⁹ , PCAMC/ KEiAG
1996	Ustroń Jaszowiec	Automation in Mineral Processing.	15	PCAMC MiAG nr 12/1996
1997	Książ	25th Jubilee Symposium of Section of Cybernetics in Mining and PCAMC. Current Issues as well as Devices and Mining Automation Systems	44	PCAMC i KEiAG/ MiAG nr 6-7/1997
1998	Krynica	26th Symposium of Section of Cybernetics in Mining Role of Automation in Solving the Current Mining Problems	17	PCAMC o KEiAG/ Wiadomości Górnictwa nr 5/1998
1999	Zakopane	PCAMC'99 Automation, Telecommunication, Informatics	19	PCAMC i KEiAG/ Wiadomości Górnictwa nr 5/1999
2000	Szczyrk	28 th Conference on Automation and Telecommunication in Mines and Processing Plants – Coal and Minerals	41	KEiAG i EMAG/ MiAG nr 4-5/2000
2001	Kudowa Zdrój	29 th Conference of Section of Cybernetics in Mining and 4 th Conference on telecommunication in mining KTG'2001 as well as 7 th APPK Conference ¹⁰ 2001	30 ¹¹	KEiAG/ publisher KEiAG

⁷ PCAMC – Polish Committee on Automation of Mines and Quarries.

⁸ MiAG – journal Mechanizacja i Automatykacja Górnictwa. [Mechanization and Automation of Mining].

⁹ KEiAG – Katedra Elektryfikacji i Automatykacji Górnictwa [Department of Electrical Engineering and Control in Mining].

¹⁰ APPK – Automatykacja Procesów Przeróbki Kopalini [Automation in Mineral Processing].

¹¹ The list did not take into consideration the papers published during APPK conferences; the materials from APPK conferences were always published as a separate book.

1	2	3	4	5
2002	Szczyrk	30th Conference of Section of Cybernetics in Mining, 5 th Conference Telecommunication in Mining KTG'2002 as well as 8 th Conference APPK'2002	23	KEiAG/ publisher KEiAG
2003	Szczyrk	31 st Conference of Section of Cybernetics in Mining, 6 th Conference on Telecommunication in Mining ATI'2003 as well as 9 th APPK Conference '2003	25	KEiAG/ publisher KEiAG
2004	Szczyrk;	32 nd Conference of Section of Cybernetics in Mining; Telecommunication and Safety Systems in Mining ATI'2004 as well as 10 th Conference APPK'2004	28	KEiAG/ publisher KEiAG
2005	Szczyrk;	33 rd International Conference of Section of Cybernetics in Mining; Telecommunication and Mining Safety Systems. ATI'2005 as well as 11 th Conference APPK'2005	32	KEiAG/ publisher KEiAG
2006	Szczyrk	34 th International Conference of Section of Cybernetics in Mining; Telecommunication and Safety Systems in Mining ATI'2006 as well as 12 th Conference APPK'2006	31	KEiAG/ publisher KEiAG
2007	Jaworze	35 th Conference of Section of Cybernetics in Mining, Telecommunication and Safety Systems in Mining ATI'2007 as well as 13 th Conference APPK'2007	49	KEiAG, EMAG / publisher EMAG
2008	Szczyrk;	36 th Conference of Section of Cybernetics in Mining of KG PAN; Telecommunication and Safety Systems in Mining ATI'2008 as well as 14 th Conference APPK'2007	27	KEiAG/ publisher KEiAG
2009	Szczyrk;	37 th Conference of Section of Cybernetics in Mining of KG PAN; Telecommunication and Safety Systems in Mining ATI'2009 as well as 15 th Conference APPK'2009 ¹²	29	KEiAG/ publisher KEiAG
2010	Szczyrk;	13 th State Conference of Mining Electric Engineering. KKEG. The Section fulfils scientific patronage of the conference.	23	KEiAG/ publisher KEiAG
2011	Szczyrk;	38 th Conference of Section of Cybernetics in Mining KG PAN; Telecommunication and Mining Safety Systems ATI'2011.	27	KEiAG/ publisher KEiAG
2012	Zakopane	14 th State Conference of Mining Electric Engineering KKEG.. The Section fulfils scientific patronage of the conference.	26	KEiAG/ publisher KEiAG
2013	Zakopane	39 th Conference of Section of Cybernetics in Mining KG PAN; Automatics, Telecommunication, Informatics ATI'2013.	29	KEiAG/ publisher KEiAG

¹² Organisation of next APPK conferences was taken over by EMAG.

1	2	3	4	5
2014	Szczyrk	15 th State Conference of Mining Electric Engineering KKEG.. The Section fulfils scientific patronage of the conference.	26	KEiAG/ publisher KEiAG
2015	Szczyrk	40th Jubilee Conference of Section of Cybernetics in Mining KG PAN; Automatics, Telecommunication, Informatics ATI'2015.	24	KEiAG/ publisher KEiAG

At the beginning years every conference was dedicated to a specific subject, for instance, to automatization of coal face machines, communication system, transportation automatization, safety systems, etc. Later, during conferences of Section of generic name Automatics, Telecommunication, Informatics (ATI) the above mentioned issues were touched in separate subject sections of this conference.

During the first years of Section operation the decision was made about annual organisation of scientific and technical conferences as meeting of scientists, manufactures and practicians interested in widely understood cybernetics in mining. Organisation of conferences as well as publication of conference materials was at the beginning undertaken by ZKMPW [Construction and Mechanisation Works of Mining Industry] in Katowice as well as GIG [Central Mining Institute] in Katowice.

After division of ZKMPW into two centres in 1975: KOMAG Gliwice as well as OBR SMEAG Katowice (Research and Development Centre of Mechanisation, Electrical Engineering and Mining Automation) and decision, that issues connected with electrical engineering, automation, telecommunication and informatics is overtaken by Centrum Naukowo-Produkcyjne (Manufacture and Scientific Centre) EMAG in Katowice (CNP EMAG) and its Research and Development Center (OBR EMAG) these conferences were organized first of all by OBR EMAG, and from time to time with some mines or with unions of coal industry. The history outline of EMAG and operation of EMAG Institute is presented widely in monograph (Trenczek, 2015). The present name of this entity is Instytut Technik Innowacyjnych (Institute of Innovative Technologies) ITI EMAG. Research and Development Center EMAG and later institutions created on the basis of this entity, shall be named in abbreviation as EMAG.

The significant contribution into organisation of the first conferences had professors from AGH: Profesor Ludger Szklarski and Profesor Roman Wojnicki as well as employees of OBR EMAG in Katowice: Ph. D. Eng. Bolesław Firganek, secretary of many years of Cybernetics Section and M.Sc. eng. Kalikst Marcinkowski.

In 1991, the co-organisers of Section of Cybernetics conference was PCAMC (Polish Committee on Automation of Mines and Quarries), and conference proceedings were published as a special issue of journal of Mechanizacja i Automatyzaacja Górnictwa (Mechanization and Automation of Mining) or as a special issue of journal of Wiadomości Górnicze (Mining News).

PCAMC is Polish unit of ICAMC (International Committee on Automation of Mines and Quarries). Committee ICAMC was set up in 1967 and worked as the independent international association till 1987 organizing 8 international conferences in different East European Countries. In 1987 the Committee was affiliated to the International Organizing Committee of World Mining Congress as the associated organization. Up to 2000 ICAMC was continuing organization of the separate conferences, till the changes in the World market showed the usefulness of incorporation these conferences to the World Mining Congress.

In 1995, for the second time in Poland, at Technical University of Silesia the international conference was organized, i.e. XII International Conference on Automation in Mining and Quarries ICAMC'95 together with ICAMC committee and Section of Cybernetics in Mining.

In 1995, Department of Electrical Engineering and Control in Mining (KEiAG) of Technical University of Silesia was included to conference organisation. Since 2000 the conferences were organised together with KEiAG as well as with EMAG.

Within 2001 – 2009 Department of Electrical Engineering and Control in Mining (EiAG) of Silesian University of Technology together with Section of Cybernetics in Mining, organised conferences named Automation of Mineral Raw Materials Dressing Plants (APPK). Proceedings of these conferences were also published by Department of Electrical Engineering and Control in Mining of Silesian University of Technology as a separate publication. Professor Stanisław Cierpisz had a large contribution into APPK conferences organisation.

Since 2003, as opposed to other conferences as were already organized first of all by manufacturers of various machines and devices for mining, the conferences of Cybernetics Section related to automation, telecommunication and informatics assumed the uniform name ATI (abbreviation for Automatics, Telecommunication, Informatics). Since 2010, Section of Cybernetics in Mining organizes also The State Conferences of Mining Electric Engineering.

In Fig. 1-3 cover pages examples are presented of conference proceedings of Section of Cybernetics in Mining of various years:

- proceedings published by ZKMPW (Fig. 1),
- proceedings of ATI Conference (Fig. 2) published as books by KEiAG (with ISBN No¹³),
- proceedings of APPK Conference (Fig. 3) published as books by KEiAG (with ISBN No).



Fig. 1. Cover page of proceedings of 2nd conference of Section of Cybernetics in Mining issued by ZKMPW in Katowice

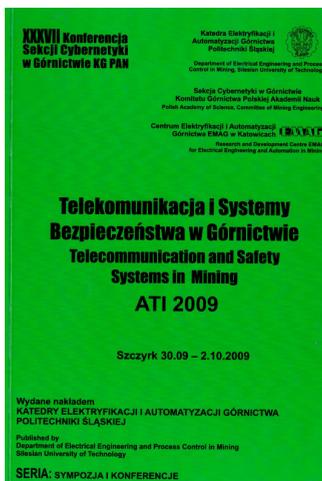


Fig. 2. Cover page of ATI conference proceedings published by KEiAG since 2002

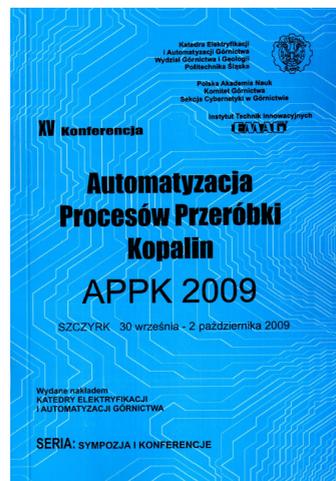


Fig. 3. Cover page of APPK conference proceedings published by KEiAG since 2002

¹³ ISBN – International Standard Book Number – unrepeated 13 digit book identifier.

3. Summary

The conferences organized by Section of Cybernetics in Mining constituted through 45 years the most important forum that presented the issues of cybernetics, automation, telecommunication and informatics in mining developed in form of theoretic papers, presentation of ready solutions for mining, experiences from operation of devices and systems. Within the scope of conferences, technical expositions of automation and telecommunication devices provided for mining as well as presentation of companies were organized. Contacts between scientists, constructors, users, manufacturer of devices and service companies constituted the essential component of every conference.

Within these years, a lot of people had contributed to success of these conferences and efficient functioning of Section of Cybernetics in Mining of Mining Committee. Authors within over 20 years organized the Cybernetics Section conferences. They managed to collect all conference proceedings. This is almost 1200 conference papers. They are available in the library of Department of Electrical Engineering and Control in Mining. Conference proceedings published with ISBN number are also available in National Library. Some proceedings (published after 2000) are also available in German National Library of Science and Technology (TIB) and University Library Hannover.

References

- Ashby W.R., 1957. *Introduction to Cybernetics*. Chapman & Hall LTD. London.
- Conference materials of Cybernetics Section in Mining of PAN of separate years. Authors' private collection.
- Collective work, 1983. *Encyklopedia PWN*. Warsaw.
- Collective work, 2001. *Leksykon naukowo-techniczny*. PWN. Warsaw.
- Mazur M., 1976. *Cybernetics and character*. PWN Warszawa.
- Trenczek S. (Ed.), 2015. *Instytut Technik Innowacyjnych EMAG (Institute for Innovation Engineering): 40 years of innovation for economy*. Monography of EMAG. Katowice.
- Wiener N., 1948. *Cybernetics, or Control and Communication in the Animal and the Machine*. Cambridge: MIT Press.