

The History of the Technical Committee 4 of IMEKO on Measurement of Electrical Quantities The beginning

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Abstract - This paper deals with the beginning and birth of the IMEKO Technical Committee 4 (TC4) on "Measurement of Electrical Quantities". It is the first part of the history of this committee and it is also a significant part of my life. I hope the reader will learn not only of the sequence of dates, but also of the humanity and commitment of the founding members. I apologize if I forgot someone or some events. We can avoid misunderstandings if we consider this paper as a first step of a dynamic process involving all those who want to write their memories and details I left out, in an open web site.

I. Introduction

The main interest of the IMEKO TC4 is emphasising both theoretical and practical aspects of research in the field of electrical and electronic measurements. TC4, one of the most successful Committees inside IMEKO, was officially established in 1984 and from then on it has organised at least one Symposium each year and has actively co-operated in the success of the IMEKO World Congresses, which are held each three years. The activities of TC4 allowed more and more researchers to be familiar with the development and use of electrical and electronic instruments for measuring, monitoring and recording electrical signals. There is a great deal of merit in what TC4 has achieved bringing together the experts from eastern and western countries to discuss a wide array of fine papers essentially directed at improving the efficiency of sensors and measuring instruments. Nowadays the world is changing faster than ever and sometimes we forget our origin, as well as our history. We live day by day without knowing what the context of anything is. The exponential growth of information and of communication nets induces most people to read much more news, that several times are unimportant stuff, rather than history. After more than twenty five years since TC4 founding I would try, in my official capacity of honorary chairman of this TC, to write its history from birth to my appointment as honorary chairman. Someone else better than me will relate to us the more recent events.

As I said during the Symposium in Iasi, where I promised to write this paper, I think that the history could allow young researchers to know the development of our TC and help us reinforce the experiencing of our individual, social and cultural identity. Considering the origin of our community is a journey into the past to understand who we are, where we can go and contribute to informal learning in the measurement science. That is why history is so important. In particular I hope this would help young people achieve their cultural identity, because they normally go through the exploration of different identities before they make a commitment to one of them. The earlier they make this commitment, the sooner they will tend to be happier and healthier than those who do not.

Human beings are mainly engaged in the ruthless pursuit of identity which is a process of maturation of their human experiences. Identity is like a dynamic entity that is formed over time, evolving from the awareness of our own existence. I am sure that cultural identity can help young people shape their social identity as well. Indeed, the recognition of the individual identity is not based on a single isolated event of a lifetime, but it is the achievement of a social identity among multiple and fluid identities. Most of the new participants to our Symposia may discover their cultural identity starting from an outline of the nature of our group and then the desire to belong to it. Therefore we have to be appealing and to proceed along the narrow and difficult way of scientific strictness. Probably we could make easier for all the participants at our Symposia and World Congresses to pursue their cultural identity if IMEKO changes from a confederation into an association and the technical committees become different societies, with their own members.

History is the teacher of life and through a careful reading of it we may reconnect the past to the present, thus creating the necessary continuity that helps to build the future. I would like to thank all the colleagues who asked me to write this paper because whenever I resort the memory, one of the most important resource of humanity, then my daily work becomes more peaceful and less tiring. I think that if I did something in the past, I would be able to do it, even better, today or tomorrow. The beauty of memories is that they are placed in our minds out of time. We must make an effort, probably unnecessary, to define their date. The extraordinary thing is that the remembrances relive as many times as we want, when and whenever we feel the need.

Writing the history of a committee is a difficult task because it is easy to forget somebody and to leave out important details. So I think that if I remember the early days of TC4 activities and I try to provide a historical retrospect through my recollections, I could not be exhaustive. Therefore this paper should be considered as a first step towards an open paper published on our web site, where who is concerned writes his memories and details I left out. I invite the colleagues also to collect in our site all the photos related to each TC4 event, improving the actual Gallery, recognizing that nowadays an archive of images is an essential tool in the historical reconstruction of our community life. I have a dream: to create an open-content portal for TC4 members in order to share their experience and remembrances in developing our Committee. We have to encourage not only TC4 members, but also individuals to write their stories and to enhance them with photos. We may create a sort of online journal on electrical measurements to discuss the issues concerning our activities from a technical and historical point of view.

It seems rather natural to try to expand the historical dimensions of TC4, starting by concentrating on one of the most important periods, that is the beginning before its foundation. In Section II with that in mind I focus on the years of founding from 1979 to 1984, so that all of us will know the TC4 founders and the framework of their commitment. This paper is the first part of this history, so in Section III I consider some details related only to the first Symposium in Como. In Section IV I restrict the analysis to the complete list of TC4 activities. In a second paper I will present TC4 events not only as a list or as a clean straight path to the obvious, but through the scientific research seen as an inviting road toward the future, that is where we want to go and we may go on.

II. The beginning

In May 1979 Giuseppe Zingales, at that time the Italian delegate to IMEKO General Council, organised a common journey for all Italian participants attending the 8th World Congress on “Measurement for progress in science and technology”, held in Moscow, USSR. Unfortunately the flight from Rome to Frankfurt airport delayed and we missed the connection with the flight to Moscow. The following flight to Moscow left the day after; therefore we had much time to talk to each other about the Congress. Many of us were experts in the field of electrical and electronic measurements and we asked Zingales why there was no TC relevant to electrical measurements in the list of IMEKO TCs. He answered that the most active and important committees inside IMEKO were TC1 on “Higher Education” (now “Education and Training in Measurement and Instrumentation”), TC3 on “Measurement of Force and Mass” (now “Measurement of Force, Mass and Torque”) and TC7 on “Measurement Theory” (now “Measurement Science”), of which he was a member. Two committees TC2 on “Photon Detectors” (now “Photonics”) and TC4 on “Microwave Measurements” existed in the field of electronic measurements. The scope of TC2 was essentially the conversion of optical images in electrical signals for applications in photometry, radiometry, optoelectronics, optical communications and astronomy. At that time TC2 had organised regular Symposia with a good number of participants. The same thing did not happen for TC4 that was unfortunately not active. Zingales had to admit the absence of a committee relevant to electrical measurements in spite of the presence of many experts in that field at IMEKO Symposia and Congresses. The main reason was that the General Council wanted to avoid competition with the IEEE, Institute of Electrical and Electronics Engineers, an association that was and still is the largest technical professional society in the world and that counts an Instrumentation and Measurement among its Societies. Because many of us were involved in some activities of this Institute, we formed the opinion that there was no need for competition between these two institutions, whereas cooperation was possible. After this discussion Zingales promised he would verify the possibility of creating a committee on electrical measurements inside IMEKO.

Now, allow me a personal remembrance. During that Congress I met for the first time Italo Gorini, who was to become one of my best friends and to whom I will always be grateful. He was a professor of “Politecnico di Torino” and the presentation at the Congress of his paper on “The metrological description of transducers” was very much appreciated, not only by me. Italo was a very generous man as well as an excellent scientist. I remember when at the Moscow airport, while we were coming back to Italy, he friendly assisted Athos Bray, who felt a little ill due to the stressful travel. Athos was another Italian colleague who had presented at the Congress an interesting survey lecture “Recent achievements and new trends in the dissemination of the standards of measurement units”.

In May 1982 during the 9th IMEKO World Congress, held in Berlin West, the basic idea of creating a Technical Committee (TC) on Electrical Measurements was shared by a group of colleagues, Adam Fiok, Wladimir Kneller, Giuseppe Zingales and in particular Jean Weiler, at that time Treasurer of Confederation. I think that Jean Weiler could be considered the Father of TC4; his memory is dear to me. The aim of this group was that IMEKO, the most important Confederation of Measurement in the world (founded in 1958 in Budapest Hungary) had to consider the creation of a committee on electrical measurements, a topic of great significance and absent from the list of TCs.

In Fig.1 you can see Jean together with the Presidents (the outgoing Pfeifer and the incoming Kuhn) and the then General Secretary György Striker, also considered as the Father of IMEKO, because he had the idea of an International Confederation of Measurement and he organised in Budapest the first two World Congresses in 1958 and 1961.

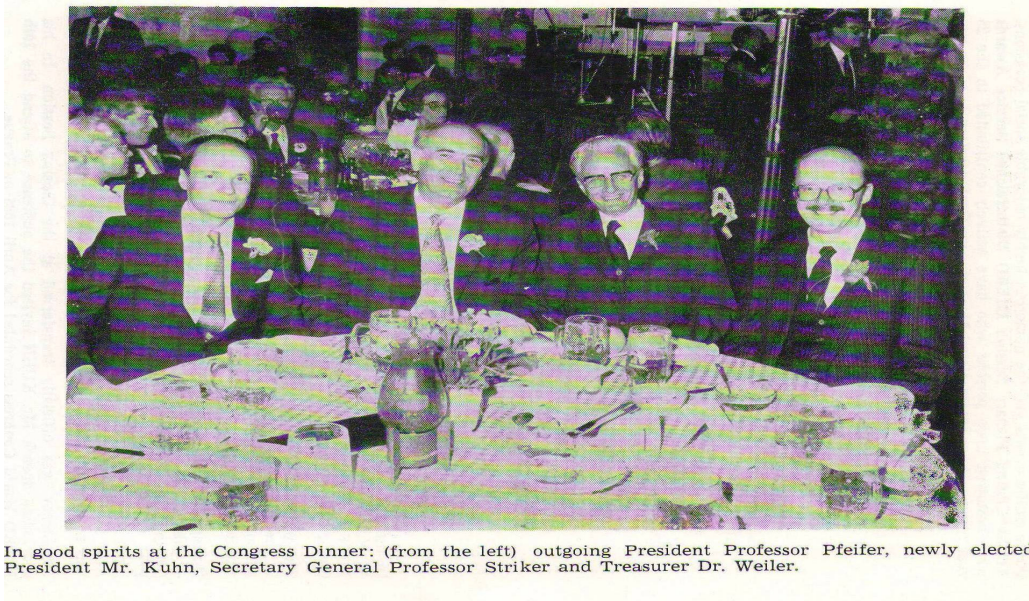


Fig.1 - A photo during the 9th IMEKO World Congress in May 1982

As I wrote above, the TC4 concerning microwave measurements had operated until 1984 when it was dissolved as the result of inactivity. There were several reasons of this inactivity, we have to consider that in the era of the Cold War, after the Second World War, both America and the Soviet Union used all kinds of propaganda in order to ensure that their populations would consider “the others” as enemies and support their own government. At the same time the advances in the microwave techniques were treated as top secret.

Table I. TC4 SCOPE

TC 4 – Measurement of Electrical Quantities.

The objectives of TC 4 deal with Electrical Measurements in the broad sense, i. e. including both power and high frequency measurements which are of vital importance in various fields of science and technology. Progress in the domain of electrical measurement science and instrumentation is very fast: it offers continually new possibilities in accuracy and speed of measurement. As they should be included explicitly in the IMEKO activities, a TC on measurement of electrical quantities has been established to deal with important problems in the field of electrical measurements, excluding the microwave field. Some emerging topics are:

1. Measurement of electrical signals, analysis of distortion and interference, non stationary signals, statistical distribution of instantaneous values.
2. of devices and systems.
3. Transducers and converters for electrical quantities
4. Measurement of electrical electronic and magnetic components in production
5. Identification of power supply systems and their elements.
6. Instrumentation related to the above topics.

All topics are considered both from scientific and technological aspects, with special attention to the application of new physical effects, the increasing of the reliability and the adaptability to changing environment. Measurement of impedances and transfer functions, static and dynamic behaviour of electrical, electronic and magnetic elements, driving signals of special form or spectrum for measurements.

The proposal of changing the name of TC4 from “Microwave Measurements” to “Electrical Measurements” was officially presented by Adam Fiok on behalf of Polish Member Organisation in May 1983 during the 26th session of IMEKO General Council in Prague, when it was also planned to celebrate IMEKO’s 25th anniversary by a two-day festive session in Budapest, the birthplace of Confederation.

The General Council created an ad hoc commission composed of the same members who had shared the idea in Berlin West (Fiok, Kneller, Weiler and Zingales), with the task of preparing a detailed proposal dealing with the new TC. Zingales kept the promise made during the Congress in Moscow and in May 1984 he organised a TC7 Symposium “Measurement and Estimation” in Bressanone, the university town for summer courses of the “Università di Padova”, with in mind to gather all the members of the commission together in order to hold a decisive meeting and write the scope of the new committee. Unfortunately Kneller was absent and Zingales proposed to ask Italo Gorini to join the group, what was done. Italo willingly accepted the invitation to become a member of the group. The commission had a long meeting during the Symposium. At the end of this meeting, the text containing the TC4 topics was approved and only minor changes were made by the General Council in the version published in the IMEKO Address Book, I report this text in Table I. Therefore we can consider Adam Fiok, Italo Gorini, Wladimir Kneller, Jean Weiler and Giuseppe Zingales the founding members of TC4. The most important changes made by the General Council to the original text concerned the title from “Electrical Measurements” replaced by “Measurement of Electrical Quantities” and the introduction into the text of the phrase “excluding the microwave field”. The aim of the General Council was clearly to limit the frequency range of the new TC 4. This limitation was the result of both the bad experience with the old TC4 and the aim to avoid interference with TC2 on photon-detectors. Whereas Weiler was a supporter of this limitation, Fiok strongly criticized it immediately after the publication of the IMEKO address book. He first expressed his strong dissent in 1985 at the 10th World Congress in Prague during the first TC4 round table and subsequently made further harsh criticisms. I had to act as a mediator between Jean and Adam in the following years, as I will make clear in the second part of this history.

Among my memories of the Symposium in Bressanone I would like to recall the interesting lecture on “Some epistemological problems related to measurement” by Mariano Cuniatti. He was the Father of the Italian “Measurement Day”, an annual meeting previously held in Como and now in Rome, where engineers, metrologists, philosophers, statisticians and natural scientists come together to discuss logical fundamentals of measurement science. Reminiscences of Bressanone are dear to me. I think that history should also enable us to know people with their fears and their joys. So let me say that the Symposium in Bressanone was one of the happiest moments in my academic career. According to what Erich Fromm writes in his book “To Have or To Be”, in my life I have always preferred the “being mode” to the “having mode” or to the “appearing mode”, because it allows me the possibility to concentrate on creative and productive activity. When I travel, I try to economize, so I generally prefer to stay in cheap hotels. By a lucky coincidence Jean Weiler, Johan Schoukens and I happened together in the same small, but beautiful hotel, while the majority of participants had chosen the Hotel Elephant which is the most famous and comfortable in Bressanone. In the evenings after the Symposium and in the mornings during breakfast we had the opportunity to talk about our research. Schoukens and I realized we had the same interest in the field of spectral analysis. He presented a paper “A high accuracy network analyser with the use of a digitiser and the IFFT”, and mine was entitled “A FFT-based digital instrument for nonsinusoidal systems”. We discussed our papers and exchanged ideas, for example I suggested to him that the use of special windows might simplify his mathematical process. Weiler appreciated our research and publicly expressed this appreciation after my presentation. From that moment on my academic career took off. Jean was very famous and considered one of the greatest experts in the field of electrical measurements: he was a farsighted man and this is the reason why I followed him and I shared all his ideas. As an example of his foresight I would like to tell you about when he met Antonio Serra for the first time. Not long after he approached me and said: “I have met a very clever young researcher from Portugal and I suggest you to consider him your scientific secretary when you become chairman of our committee”, and in 1998 I did just this. His appreciation of my presentation at the Symposium in Bressanone brought my researches to the attention of several Italian colleagues. In particular Luigino Benetazzo asked me to co-operate with his group. He and Italo Gorini became my mentors for several years.

The IMEKO General Council, in the resolution concerning the foundation of the new TC4, together with its scope, also approved its membership. Jean Weiler (Switzerland) was elected the first Chairman of the Committee and Adam Fiok (Poland) the Scientific Secretary. The other members were: I. Adarski (Bulgaria), A. Braun (BRD, Federal Republic of Germany), J. Chaloupka (CSSR Czecho-Slovak Socialist Republic), L. Erard (France), U. Fruhauf (DDR, Democratic Republic of Germany), I. Gorini (Italy), W. Kneller (USSR, Union of Soviet Socialist Republics), H.G. Meyer (BRD, Federal Republic of Germany), A. Ohte (Japan), J. Schoukens (Belgium), A. Sowinski (Poland), W. Wehrmann (Austria), G. Zingales (Italy), I. Zoltan (Hungary).

The presence of two members from Italy, Germany and Poland was accepted in recognition of the contribution

that the participants from these countries in IMEKO events have made to the development of electrical measurements and because their delegates in the General Council had shown a willingness to participate actively in the work of the new committee. In 1986 during the 1st Symposium of TC4 in Como Jean Weiler announced his intention of leaving the chairmanship after three years, although the IMEKO “Constitution and by – laws” allows the Chairman to be reappointed not more than twice upon recommendation of the Technical Board and with the acceptance of the relevant member organisation. Jean believed in the development through change and also proposed a new position that of deputy chairman, besides that of scientific secretary, provided that after three years the deputy chairman became chairman and the secretary became deputy chairman. I am happy that this rule was observed in the following years with the exception of Adam Fiok for reasons which will become clear in the second paper about the history of TC4.

III. The first Symposium

The venue for the 1st Symposium on “Noise in Electrical Measurement” was Villa Olmo in Como, a beautiful town on the lake with the same name in North Italy. Giuseppe Zingales asked Arnaldo Brandolini from the “Politecnico di Milano” to organize the conference in the same place as the Italian “Day of Measurement”. The date, 19-21 June 1986, also coincided with the period in which the Day was usually held. The “Politecnico di Milano” was connected by a special covenant to the “Alessandro Volta” Centre a non-profit organization aimed at promoting scientific research, contributing to the advance of scientific knowledge and spreading scientific and technological culture. The Symposium was organised with the support of this Centre and was a success. Several topics concerned the noise not only from the point of view of characterisation, measurement and reduction techniques in analog and digital signal processing, but also considering the noise as a signal for diagnostics by noise. Also electromagnetic compatibility in measurements was inserted in the topics. In Fig. 2 you can see Fiok and the organisers of the Symposium, Zingales and Brandolini.



Figure 2. From the left Fiok, Zingales and Brandolini

At the time of the 1st Symposium I was a member of an examining Italian board and the commission decided to meet during the conference. I had to present the paper “Noise measurement for estimation of voltage and frequency fluctuations in power systems” and asked other members to wait for a quarter of an hour, the time of my presentation. In fact they waited for more than half of an hour, because many participants intervened in what was not simply a discussion of my paper, but rather a dispute. One colleague was especially aggressive in insisting I check my results. Unfortunately, I do not remember his name, but later at another Symposium, he approached me and apologised for his aggression. I answered him: “There is no need to apologise. If no one questioned my papers I would worry that they were of no interest, while heated discussion forces me to think about how I can improve my work”.

For example I remember another heated discussion with István Kollár. Fortunately we had the possibility to make clear our point of view after the presentation and we friendly co-operated in the preparation of the scientific part of the 8th TC4 Symposium in Budapest, as I will report in the second part of this history.

IV. List of the events

- 1985 - 10th World Congress in Prague, CZECHOSLOVAKIA, Round table on “Emerging Problems in Measurement of Electrical Quantities”
- 1986 - 1st Symposium on “Noise in Electrical Measurement”, Como, ITALY, June 19-21

- 1987 - 2nd Symposium on “Industrial Measurement of Electrical and Electronic Component and Equipment”
Warsaw, POLAND, May 26-28
- 1988 - 11th World Congress in Huston, Texas, USA, Round table on “Electrical Quantities with special
emphasis on Harmonic, Inter-Harmonics and Transients”
- 1989 - 3rd Symposium on “Measurement in Electrical and Electronic Power Systems”, Zurich,
SWITZERLAND, September 20-22
- 1990 - 4th Symposium on “Intelligent Measurement of Electrical and Magnetic Quantities” Varna,
BULGARIA, November 15-17
- 1992 - 5th Symposium on “Electrical Measuring Instruments for Low and Medium Frequencies”, Vienna,
AUSTRIA, April 8-10
- 1993 - 6th Symposium on “Intelligent Instrumentation for Remote and On-Site Measurements”, Brussels,
BELGIUM, May 12-13
- 1994 - 13th World Congress in Torino, ITALY, Decision of foundation of a Working Group on “ADC
Modelling and Testing”
- 1995 - 7th Symposium on “Modern Electrical and Magnetic Measurement”, Prague, CZECH REPUBLIC,
September 13-14
- 1996 - 1st Workshop on “ADC Modelling and Virtual Instrumentation”, Smolenice Castle, SLOVAKIA, May
7-9
- 8th Symposium on New Measurements and Calibration Methods of Electrical Quantities and Instruments,
Budapest, HUNGARY, September 16-17
- 1997 - 2nd IMEKO Workshop on ADC Modelling and Testing, Tampere, FINLAND, June 1-2
- 9th Symposium on “Electrical Instruments in Industry”, Glasgow, SCOTLAND, September 8-9
- 1998 - 10th Symposium on “Development in Digital Measuring Instrumentation”
3rd Workshop on “ADC Modelling and Testing”, Naples, ITALY, September 17-18
- 1999 - 4th Workshop on “ADC Modelling and Testing Bordeaux”, FRANCE, September 09-10
- 2000 - 5th Workshop on “ADC Modelling and Testing Bordeaux”, Wien, AUSTRIA, September 26-28
- 2001 - 11th Symposium on “Trends in Electrical Measurements and Instrumentation”
6th Workshop on “ADC Modelling and Testing”, Lisbon, PORTUGAL, September 13-14
- 2002 - 7th Workshop on “ADC Modelling and Testing”, Prague, CZECH REPUBLIC, June 26-28
- 12th International Symposium on “Electrical Measurements and Instrumentation”, Zagreb, CROATIA,
September 25-27
- 2003 - 8th Workshop on “ADC modelling and Testing”, Perugia, ITALY, September 8-10
- 2004 - 13th Symposium on Measurements for Research and Industrial Applications,
9th Workshop on “ADC Modelling and Testing”, Athens, GREECE, 2004, September 29 - October 1
- 2005 - 14th Symposium on “New Technologies in Measurement and Instrumentation”
10th Workshop on “ADC Modelling and Testing”, Gdynia/Jurata, POLAND, September 12-15
- 2006 - 11th Workshop on “ADC Modelling and Testing”, Rio de Janeiro, BRAZIL, September 17-22
- 2007 - 15th Symposium on “Novelties in Electrical Measurements and Instrumentation”
12th Workshop on “ADC Modelling and Testing”, Iasi, ROMANIA, September 19-21
- 2008 - 16th Symposium on “Exploring New Frontiers of Instrumentation and Methods for Electrical and
Electronic Measurements”
- 13th Workshop on “ADC Modelling and Testing”, Florence, ITALY, September 22-24
- 2009 - 14th Workshop on “ADC Modelling and Testing”, Lisbon, PORTUGAL, September 22-24.

IV. Conclusions

This paper is only the beginning of our history. I hope it may be interesting as the other parts and help us reinforce our friendship for the development of science in the field of electrical and electronic measurements.