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Dear Reader

This issue is focusing on highlights of the past several months, since last summer. As a matter of fact, the Event Calendar provides a full glimpse of our activities, but let's complete the picture.

In November 2002 the General Council of the Confederation met in Dubrovnik to discuss the current situation. The GC-Session, as usual, was preceded by the meetings of the Advisory Board, the MEASUREMENT Editorial Board and the Technical Board.The AB dealt primarily with the Strategic Rolling Plan prepared by the Secretary General up to 2007 giving an evaluation and recommendations for new trends of work. The main objective is to make IMEKO a really world-wide organization with increased cooperation of societies from certain countries where there is a strong and important measurement community not yet involved.Therefore the unanimous admission of SAMET, the Society for Advancement of Metrologists in Pretoria, South Africa was an especially welcome act. The Society was formed in April 2001 and its Constitution is in compliance with that of the Constitution and By-Laws of the Confederation – of course a severe condition. The next change in membership is to be expected in Mexico, a transfer of membership in fact, from the Mexican Society of Instrumentation to the Mexican Association of Metrology. The latter one will be more in line concerning future activities.

Another point to be seriously considered is, how to attract young scientists and engineers in view of the existence of outstanding competition in the field. The adoption of a good publication policy was mentioned here in the first place. IMEKO's presence on the Internet needs further and constant development. This problem seems to be excellently solved now by the Information Officer, Dr. Dirk Röske at the Physikalisch-Technische Bundesanstalt (PTB, Braunschweig/Germany). The journal MEASUREMENT, under the guidance of the new Editor-in-Chief, Professor Ken T.V. Grattan (The City University, London) has its own share and responsibility in that respect, too. The publication of 8 numbers is planned in 2003 (Volumes 33-34).

Over 500 extended abstracts have been submitted to the forthcoming, 17th IMEKO World Congress to be held in Dubrovnik, Croatia, June 22-27, 2003. The 18th IMEKO World Congress is scheduled for 2006 in Rio de Janeiro, together with the 4 th Brazilian Congress of Metrology.

All about the above and much more can be read on our Website:

www.imeko.org

We will be happy to capture and hold your interest.

Karolina Havrilla
Secretary of IMEKO
Editor of the Bulletin

List of the topics of XVII IMEKO World Congress

TC 1 Education and training in measurement and instrumentation

- Methods of teaching and training
- Education and training for intelligent measurement and instrumentation
- Virtual instrumention for training in measurement

TC 2 Photonics

Measuring Procedures
- Spectroscopy (Fluorescence, Raman, FM etc.)
- Interferometry (White-Light and Laser-Interferometry, Speckle, OCT, Food etc.)
- Modulating Techniques (Pulse, Doppler, FM etc.)
- Structured Illumination Techniques
- Image Sensing (Camera-Based Sensors)

Development
- Miniaturization of Optical Measurement Systems (e.g. Integrated Optical Systems, Fibre-Optical Sensors, Laser Sensors)

Application Fields
- Life Science (Medicine, Environment, Pharmacy , Biology, Food etc.)
- Production Technology
- IT-Systems
- Traffic

General Interest
- Comparison of Optical Systems in Competition with other Measuring Techniques

TC 3 Measurement of force, mass and torque

- Dynamic force and torque measurement
- Measurement standards, instruments and techniques for force, mass and torque measurement
- Dynamic weighing of road vehicles in motion

- Calibration problems under dynamic conditions
- Development trends in force, mass and torque measurements

TC 4 Measurement of electrical quantities

- Direct current and low frequency measurements
- Radio frequency, microwave and millimeter wave measurements
- Optical wavelength metrology
- Traceability and international compatibility of measurements
- Standards
- Automated measurement systems
- Advanced instrumentation
- A/D and D/A converters
- Digital signal analysis and processing
- Software measurements
- Environmental measurements
- Biomedical measurements
- Power and energy
- Time and frequency
- Sensors
- Measurements at universities

TC 5 Hardness measurement

- New theoretical and practical knowledge in hardness testing
- New method and equipment for hardness measurement
- Role of hardness measurement for science and industry

TC 7 Measurement science

- Foundations of measurement
- Mathematical modelling for measurement applications
- New measurement principles
- Knowledge-based measurements
- Artificial intelligence in measurement and instrumentation
- Social role of measurement
- Emerging topics of measurement science

TC 8 Traceability in metrology

- Uncertainty evaluation for the measurement results
- Evaluation of measurement standards
- Quality assurance of measuring and test equipment

TC 9 Flow measurement

- Flow measurement in environmental engineering
- Unsteady flow measurement
- Measurement of very small to very large flow

TC 10 Technical diagnostics

- Basic principles and development trends in diagnostic work
- Methods, instrumentation and systems
- Diagnostics for the improvement of the quality of life
- Medical noninvasive diagnostics

TC 11 Metrological infrastructures

- Regional cooperation in metrology
- International recognition of measurements and calibrations
- Measurement support services: training, maintenance, repair, calibration

TC 12 Temperature and thermal measurements

- Standards and intercomparisons
- Sensors and new measurement techniques
- Humidity measurements
- Industrial and environmental applications
- Calibrations and uncertainties

TC 13 Measurement in biology and medicine

- Mathematical models for biomedical measurements
- Connectionist approach to biomeasurements
- Digital imaging in biomedicine
- Special instrumentation for biomeasurements
- Biomedical measurement to improve the quality of life

TC 14 Measurement of geometrical quantities

- Dimensional metrology and quality control in production
- Manufacturing integrated measurement
- Laser metrology for precision measurement and inspection
- Surface texture and its micro-characteristics

Cavtat near Dubrovnik, by the Adriatic Sea – site of the 17th IMEKO World Congress in June 2003

TC 15 Experimental mechanics

- Impact and role of experimental mechanics for product innovation
- Advances in optical methods and digital image processing
- Development of sensors and systems working under adverse or dynamic conditions
- Standards and certification
- Design of experiments
- Experimental mechanics for micro-nano miniaturization

TC 16 Pressure and vacuum measurement

- Innovative sensing techniques and instrumentation
- Primary standards and calibration uncertainties
- Calibration techniques and services

TC 17 Measurement in robotics

- Integrated measurement technologies to improve robot intelligent behavior
- Sensors for advanced robotics
- Evaluation and measurements of robot system performance
- Robots to help improve the quality of human life
- Telexistance and/or advanced Teleoperation
- Virtual reality interface for advanced robots

TC18 Measurement of human functions

- Human movements and actions, such as hand manipulation, arm movements, posture control, gait locomotion, sports exercises, etc.
- Human perception and cognition: vision, auditory and somato-sensory systems, space and motion perception, attention and performance, etc.
- Interaction and integration of human perception and cognition with movements and behaviours
- Related Fields: Human Interface, Brain Sciences, Rehabilitation and Welfare, Sports Science, Human Factors.

TC19 Environmental measurement

- Analytical measurement of the 3 main environmental media: air, water and soil
- Instrumental methods for measurement of environmental noise and vibration pollution
- Remote sensing methods for measurement of environmental pollution
- Development of new platforms and image processing techniques for detection of potential sources of contamination and monitoring of air, water and soil quality
- Quality assurance and quality control of environmental measurements

TC 20 Measurement techniques for the construction industry

- Sensor and actuator developments
- Damage identification
- Monitoring
- Decision making

Organised by

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International Association for Mathematics and Computers in Simulation
IEEE Instrumentation and Measurement Society

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Event calendar

2003

IMEKO XVII – 17th IMEKO World Congress
Metrology in the 3 rd Millennium
Dubrovnik, Croatia
June 22–28

Contact: Mrs. N. Stambuk-Borsic
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http://www.hmd.hr

TC4 – Measurement of Electrical Quantities
8th Workshop on ADC Modelling and Testing
Perugia, Italy
September 8 –10

*Contact:*Prof. P. Carbone
University of Perugia
Department of Electronic Engineering and Informatics
Via G. Duranti, 93
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Phone: +39 075 5853629
Fax: +39 075 5853654
E-mail: carbone@diei.unipg.it
http://www.diei.unipg.it/iwadc2003

TC9 – Flow Measurement
FLOMEKO 2003 – 11th Conference on Flow Measurement
Groningen, The Netherlands
May 12–14

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Fax: +31 50 521 1946
E-mail: g.h.sloet@gasunie.nl
www.flomeko2003.nl

TC15 – Experimental Mechanics
2nd Youth Symposium on Experimental Solid Mechanics
Ravenna, Italy
May 7–10

Contact: Prof. A. Freddi
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DIEM
Viale Risorgimento, 2
40136 Bologna, ITALY
Phone: +39 051 209 3455
Fax: +39 051 209 3412
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http://diem101.ing.unibo.it/imeko/

TC16 – Pressure and Vacuum Measurement
2nd Conference on Pressure and Vacuum Measurement
Beijing, China
May 20–24

Contact: Mr. Zhang Pengcheng
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Fax: +86 10 64218709
E-mail: Zhangpch@nim.ac.cn
www.chinajlnet.com/ImekoTC16

TC17 – Measurement in Robotics
ISMCR 2003 - 13th International Symposium on Measurement and Control in Robotics
Madrid, Spain
September

Contact: Dr. M. Armada
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Consejo Superior de Investigaciones Cientificas
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Fax: +34 91 871 70 50
E-mail: armada@iai.csic.es

Co-sponsorships

SENSOR&TEST 2003 – Exhibition with Congress and Workshops
Nuremberg, Germany
May 13–15

Contact: AMA Service GmbH.
Von-Münchhausen-Strasse 49
31515 Wunstorf, GERMANY
Phone: +49 5033 9639-0
Fax: +49 5033 1056
E-mail: info@sensorfairs.de
www.sensorfairs.de

World Day of Metrology
Delft, The Netherlands
May 20

Contact: Prof. P.A. Wieringa
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5th IFAC Symposium on Modelling and Control in Biomedical Systems (TC13)
Melbourne, Australia
August 21–23

Contact: Dr. Koon-Pong Wong
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ICCE/10 – Tenth Annual International Conference on Composites Engineering
New Orleans/LA, USA
July 20–26

Contact: Prof. D. Hui
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Fax: +1 504 280 5539
E-mail: DHui@uno.edu
www.uno.edu/~engr/composite

20th Danubia-Adria Symposium on Experimental Methods in Solid Mechanics (TC15)
Györ, Hungary
September 24–27

Contact: Dr. L. Borbás
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PO Box 433
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http://www.gte.mtesz.hu/das/

2nd International Conference on Metrology
Eilat, Israel
November 4–6

Contact: Dr. I. Kuselman
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www.isas.co.il/metrology2003

APMF'2003 – The Asia-Pacific Symposium on Measurement of Mass, Force and Torque (TC3)
Shanghai, China
November 3–6

Contact: Dr. Zhang Yue
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MERA-2003 – Specialized Exhibition on Measurement Engineering, Control and Automation
Moscow, Russia
November 3–6

Contact: GOSSTANDART of Russia / EUROEXPO Ltd.
Leninsky pr. 9
119991 Moscow, RUSSIA
Phone: +7 095 248 2739
Fax: +7 095 2481787
E-mail: mera@euroexpo.ru
www.euroexpo/ru

2004

TC4 – Measurement of Electrical Quantities
13th Symposium on Measurements for Research and Industrial Applications
9th Workshop on ADC Modeling and Testing
Athens, Greece
September 29 – October 1

Contact: Prof. E. Kayafas
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Fax: +30 210 772 2538
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TC7 – Measurement Science
10th Symposium on Advances of Measurement Science
St. Petersburg, Russia
June 30 – July 2

Contact: Prof. S.V. Muravyov
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TC9 – Flow Measurement
FLOMEKO 2004 – 12th Conference on Flow Measurement
Beijing, China
September 14–17

Contact: Mrs. Zhao Ruojiang
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TC12 – Temperature and Thermal Measurements
TEMPMEKO 2004 - 9th Symposium on Temperature and Thermal Measurements in Industry and Science
Cavtat-Dubrovnik, Croatia
June 22–25

Contact: Prof. D. Zvizdic
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Phone: +385 1 616 83 33
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TC14 – Measurement of Geometrical Quantities
8th International Symposium on Measurement and Quality Control
Erlangen, Germany

Contact: Prof. A. Weckenmann
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Phone: +49 9131 8526520
Fax: +49 9131 856524
E-mail: weckenmann@qfm.uni-erlangen.de

TC17 – Measurement in Robotics
ISMCR 2004 – 14th International Symposium on Measurement and Control in Robotics
Houston/Texas, USA
September

Contact: Dr. Z. S. Taqvi
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TC18 – Measurement of Human Functions
TC8 – Traceability in Metrology
TC11 – Metrological Infrastructures
2nd Symposium on Measurement, Analysis and Modeling of Human Functions and 1st Mediterranean Conference on Measurement
Genova, Italy
June 14–16

Contact: Dr. P.G. Morasso
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16145 Genova, ITALY
Phone: +39 010 3532749
Fax: +39 010 3532154
E-mail: morasso@dist.unige.it

2005

TC3 – Measurement of Force, Mass and Torque
19th Conference on Force, Mass and Torque Measurement
Cairo, Egypt
February

Contact: Prof. A.A. El-Sayed
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Force Department
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E-mail: AhmedAli@nlab.nis.sci.eg

TC14 – Measurement of Geometrical Quantities
8th International Symposium on Laser Metrology
Merida, Mexico

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News in brief

New TC Chairmen
TC4 – Measurement of Electrical Quantities
Dr. Milos Sedlacek, Czech Republic
TC5 – Hardness Measurement
Dr. Konrad Herrmann, Germany

The Editorial Board of the IMEKO Journal MEASUREMENT will be renewed in accordance with the changes of TC officers. Further members' names will also be added, mainly from the US and Asia. VISIT the journal Website:
www.elsevier.com/locate/measurement

2003 is election year in IMEKO, new Officers, Board and Standing Committee members will be elected for the next three-years. Distinguished Service Awards will be handed over at the Closing Session of the 17th World Congress, together with the György Striker Junior Paper Award (the latter is a money donation of the Founding Secretary General of the Confederation and his wife).

The Secretary General, Dr. Tamás Kemény was invited to present a paper on the present and future role of IMEKO in the international measurement community at the Second International Conference on Metrology (Trends and Applications in Calibration and Testing Laboratories) to be held in Eilat, Israel, November 4-6, 2003. The Conference will be organized by the Israeli Metrological Society together with The National Conference of Standard Laboratories (NCSL International) and The Cooperation on International Traceability in Analytical Chemistry (CITAC) and co-sponsored by the International Measurement Confederation.

At IMEKO XVII there will be a number of contributions devoted to the subject of international trends in metrology. TC11 – Technical Committee on Metrological Infrastructures will have a discussion meeting about that, bearing in mind that several international organizations deal with the matter presently.

IMEKO TC4 – Measurement of Electrical Quantities

Working Group "A/D and D/A Converter Metrology"

1. Introduction

Analog-to-digital converters (ADCs) are needed in all those applications which, interfacing with the analogue world, exploit the digital processing of data. As digital processing is more and more gaining ground over analogue signal processing, the importance of ADCs correspondingly increase.
Digital signal processing systems are generally designed by considering analogue-to-digital converters (ADC's) as ideal components affected only by quantization and sampling errors. Vice versa, the effect of the ADC actual working conditions modifies the expected digital values and could compromise the effectiveness of the digital signal processing as a whole. ADC's are among the components that mostly influence metrological performance of digital measurement systems. ADC errors limit system dynamic, its frequency band and so on, by adding distortion and error effects to the output. Therefore, a deeper insight into the ADC characteristics is needed.
Furthermore, the digital-to-analogue converters (DACs) are widely used in many fields, i.e. in the automatic system to drive actuators, in the digital music, and so on. In particular, the possibility to integrate in one chip an ADC, a DAC and a DSP has improved the applicability of these components to new fields, as in mobile telecommunication systems.
In order to improve the ADC and DAC performance many efforts are now carried out in several Research Centres. The efforts are oriented to set up new models, testing methods and error correction techniques.
As in other technical fields, also in the ADC error investigation the use of models has become more and more widespread. Modelling actual ADC allows the error characteristic to be analysed and, hence, its correction to be carried out more easily. Then, in the diagnostic process, it allows a fault model to be set up in order to isolate a possible fault condition.
In order to improve the ADCs and DACs performance, some ideas have been proposed, either linked to the improvement of the chip design or related to the correction of the ADC and DAC errors by means of correction techniques. This last field requires to set up opportune models and testing techniques to correctly estimate the metrological characteristics of the corrected component.

These problems are of high relevance not only for producers but mainly for system integrators and end-users. Such customers build complex systems where the accuracy of ADC and DAC impacts in a decisive way the property of final product. Consequently user-friendly standards for ADC and DAC assessment will be highly welcome for these target users. It is worth to underlying that; now, there is a lack in the realisation of a European standard for ADCs and DACs.

2. Mission

IMEKO TC-4 Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology serves as a forum for users, developers, and researchers involved in researches on ADCs and DACs, under IMEKO Technical Committee on Measurement of Electrical Quantities. The Working Group was formally established during the Tampere IMEKO World Congress (Tampere, Finland, June 2-6, 1997 – IMEKO Bulletin, N°36, November 1997). This forum allows to come together for partners dealing with all problems concerning:

- ADC and DAC modelling;
- ADC and DAC testing;
- ADC and DAC specifications;
- Digital and analogue methods of systematic data correction;
- ADC and DAC interfaces in virtual instruments.

In order to reach this aim a network of members consisting from representatives of the scientific institutions, industrial partners and distributors should be created. Its main goal is the development of technical knowledge and exchange of information between all partners concerning ADCs and DACs. Such research networks will encourage interaction between different disciplines, the combination of different technologies, the transfer of techniques from one scientific domain to another, the dissemination of results and co-operation between academia and industry.
To this aim the *Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology* will:

- disseminate information, about ADCs and DACs, by means of appropriate networks linking groups;
- organise periodical meetings on the above mentioned topics;
- support from the scientific point of view the publication of books, notes, and so on;

- create a WWW for a real time exchange of ideas and information;
- encourage research teams from a number of countries to work together on high quality joint research projects;
- promote the training and mobility of researchers, particularly young post-doctoral researchers;
- participate in international activities dealing with, ADCs and DACs evaluation methodologies, their architectures and standardisation;
- set up special interest groups to address the activities of international bodies dealing with issues of interest of the Working Group, such as standardisation issues (e.g. IEEE TC-10);
- create links with partners from industry;
- prepare simple rules for final users to assess A/D and D/A converters.

3. Organisational structure

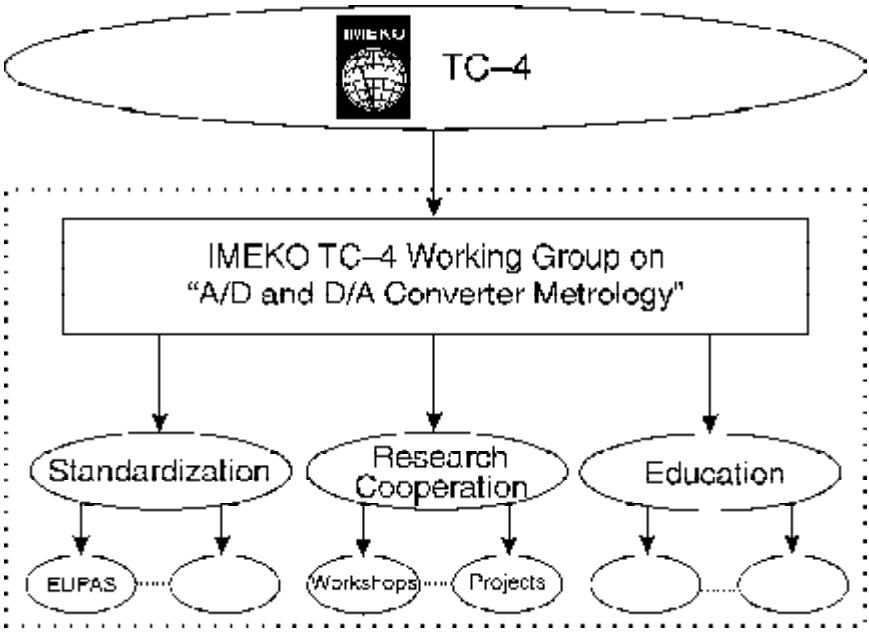
The *Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology* is included in the organisational structure of the IMEKO-TC4 Committee. It is a collection of technical experts.
The Working Group chair extends the member list by consulting both domain experts and literature. Furthermore, Working Group chair co-ordinates the work of the members, and takes the official contacts with other organisations.
In particular, the Working Group operates as follows:
In occasion of IMEKO Workshops and Congresses, round tables On specific Project Proposals are carried out with the aim to submit to the scientific community there present the technical content of the Proposal. Then, a Promoting Committee and the related co-ordinators are successively defined. The Promoting Committee focuses on the scientific object of the Project initiative and the corresponding financing action, to this aim, e.g. European Union Programmes for Research, is carried out through specific financing actions.
The Promoting Committee defines a Technical Committee for the Project where further participants and industrial partners (manufacturer and end users) are involved.
The Promoting Committee adopts the approach of preparing drafts for wide review and friendly comments. Then, Technical Committee decides on changes to be made, and incorporate them in the final work.
The Project development is organised by subdividing the work in more tasks each one entrusted to a specific Group according to specific skills.

4. Current activities

According to the main aims of the *Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology* the current activities are divided in three fields:

- research;
- standardisation;
- education.

In the following the details concerning these activities will be illustrated.

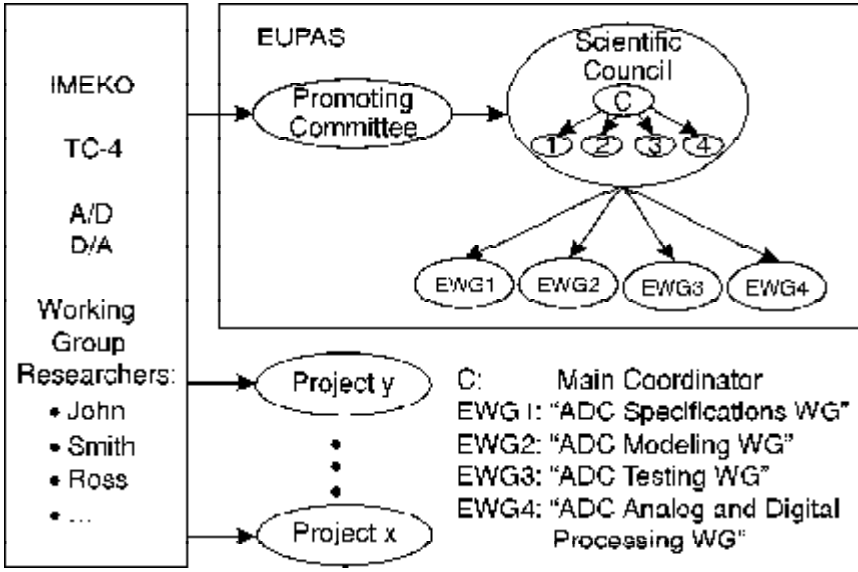


4.1 Standardisation Activities

For what concerns the standardisation activities the **EUPAS** project (**E**uropean **P**roject on ADC-based device **S**tandardisation) is the heart of standardisation activities of the *Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology.*

During the round table discussions organised in Tampere in the framework of XIV IMEKO World Congress, the following management and short-term tasks for EUPAS have been agreed:

- Prof. Harald Schumny of PTB (Germany) was proposed as main coordinator of the EUPAS project (C in Fig.), Prof.P.Arpaia was proposed as secretary of the project;
- The following coordinators for the single Workgroups (EWGi):
- Prof. P. Marchegay of Université de Bordeaux (France) for "ADC and DAC Specifications" (C1 in Fig.);
- Prof. Konrad Hejn of IPE-PW (Poland) for "ADC and DAC modelling" (C2 in Fig.);
- Prof. Vladimir Haasz of CTU (Czech Rep.) for "ADC and DAC testing" (C3 in Fig.);
- Prof. F.Cennamo of Università di Napoli (Italy) for "Analog and Digital processing" (C4 in Fig.).
- Collect adhesions to single Technical Working Group from researchers of IMEKO TC-4 Working Group on "AD and DA Converter Metrology";
- Creation of a special section devoted to EUPAS Project of the international journal "Computer Standards & Interfaces" of Elsevier.



Organisation of EUPAS in the *Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology*.

4.2 Research Activity

The activities in this field have been aimed to realize a research network first of all at European level. To this aim some basic ideas are followed:

- continuous exchange of information by establishing personal contacts among all the researchers involved in the field of ADCs and DACs;
- development of common research activity in order to optimize at continental level financial and human resources;
- establishment of stages especially for young researchers in other European laboratories involved in the field of ADCs and DACs;
- organisation of an annual Workshop in order to discuss the common activities.

Good results in this field have been obtained in a short time, indicating the need of an European forum in the field of ADCs and DACs. As a matter of fact in the last years numerous exchanges of researchers have been carried out.
The results of the common research activities can be found in the most important Journals (*IEEE Transactions on Instrumentation and Measurement, Measurement Journal, Computer Standard and Interfaces*), and Proceedings of Conferences (*IEEE Instrumentation and Measurement Technical Conference, IMEKO TC4 Workshop on ADC Modelling and Testing*) in the field of ADCs and DACs.
The Workshop on ADC Modelling and Testing is the annual meeting of the researchers involved in the studies of new ADC models and testing methods. The aim of the Workshop is to give a common forum for international recent results and applications in the study of ADCs and DACs.

- The 1st IMEKO Workshop on*ADC Modelling and Testing* - Smolenice (SK) May 1996 was a successful event with regard to the high level of the technical papers, the relevant and qualified participation and the friendly atmosphere in technical and social programs. A Special Issue, including selected papers presented at the Workshop, has been published in the IMEKO *Measurement Journal*.
- The 2nd Workshop on*ADC Modelling and Testing* has been held as a parallel event during XIV IMEKO World Congress in Tampere (Finland) June 1997. The 2 nd Workshop was the meeting point for the Research Group on ADCs. To this aim a Round Table on the Project EUPAS- European Project on ADC Standardisation developed by the Research Group on ADC's has been held, too. A Special Issue on the *Computer Standard & Interfaces Journal* was published.
- The 3rd Workshop has been held as a parallel event during X IMEKO TC4 Symposium in Naples (Italy). The Workshop has been the meeting point for the European Research Group on ADCs. Contributions from other organisations (IEEE, IEC, IEE, ...) operating

in the field of ADCs have been presented and a continuous exchange of information has been established. A Special Issue o f the *Measurement Journal* was published.

- The 4th Workshop has been held in Bordeaux (France) in September 1999. It focused on more strong contacts with industries working in the field of ADCs and DACs not only from the production point of view but from the user point of view, too. A Special Issue of the *Measurement Journal* was published.
- The 5th Workshop on *ADC Modelling and Testing* has been held, as a parallel event during the XVI IMEKO World Congress, in Vienna (Austria) September 2000. This Workshop was supported by the European Commission, as *High Level Scientific Conference*. The IEEE TC-10 co-sponsored the Workshop. A Special Issue of the *Measurement Journal* was published.
- The 6th Workshop on *ADC Modelling and Testing* has held in Lisbon (Portugal), September 2001, as a parallel event during the 11th TC-4 Symposium. It was supported by the European Commission, as High Level Scientific Conference. A Special Issue of the *Measurement Journal* and of the *Computer Standard & Interfaces Journal* was published.
- The 7th Workshop on *ADC Modelling and Testing* has been held in Prague (Czech Republic), June 27-28, 2002. It was a joint event with 4th IEE ADDA Conference. A Special Issue of the *Measurement Journal* and of the *Computer Standard & Interfaces Journal* was organized.

New activities are oriented to create better links among researchers involved in (i) DACs modelling and testing, to this aim a Special Issue of Measurement Journal on DAC Modelling and Testing was published and in the 6th Workshop a Special Session on DAC Modelling and Testing was included; and (ii) image digitizers, to this aim in the 5th Workshop a Special Session on Image Digitizers has been included and a Special Issue of Measurement Journal on Image Digitizers was published.

4.3 Educational Activity

The next objective for the activities of the *Working Group on Analogue-to-Digital & Digital-to-Analogue Converter Metrology* is to carry out common activities in the educational field.

This goal can be obtained by means of the participation in the SOKRATES Programme supported by the European Union.

The participation of the European members of the Working Group in the SOKRATES Programme gives the possibility to exchange information in the educational field, allows the exchange of teachers and students.

A first result in this activity is the organisation in the framework of SOCRATES Programme of the ***Summer School on Data Acquisition System***. The main aim of the School is to create a common European knowledge in the field of data acquisition systems. The basic idea is to employ the best teachers for each particular subject and to diffuse to the young engineers their knowledge. The School will give the possibility to compare different teaching activities in the field of data acquisition systems.

The *1st European Summer School on Data Acquisition Systems* was given in June 2001. The School was the result of the collaboration of four European Universities (University of Calabria, University of Sannio, Technical University of Kosice and Technical University of Prague) and it was financially supported by the European Union. The location of the School was the Technical University of Kosice – Slovak Republic. The school was organized in the framework of Socrates/Erasmus Programme. The participants were graduated and PhD students coming from EU State Members. The number of participants was fixed equal to 12.

The *2nd European Summer School on Data Acquisition Systems* was organized in June 2002, in the framework of Socrates/Erasmus Programme (Action *Intensive Programme*). The location of the School was the Technical University of Kosice – Slovak Republic. Professors and students of the Technical University of Budapest participated in this event. The School included the participation to the tutorials given for the 7 th Workshop on *ADC Modelling and Testing*.

A CD-Rom including the lectures given during the school, documentation and the results of the experiments developed by the students was realized.

In the successive years the School will include more European Universities and Industries.

Furthermore, a successive step is the realisation of a common subject on data acquisition systems. As a matter of fact, the SOCRATES Programme includes the possibility to finance the development of subjects in which are interested several European Universities.

The Working Group co-ordinators

Pasquale Daponte
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ITEE'2003 – First International NAISO Symposium on

Information Technologies in Environmental Engineering

Gdansk, Poland
June 24–27, 2003

NAISO = Natural and Artificial Intelligence Systems Organization

GENERAL INFORMATION

Acquisition, storage and processing of environmental information are becoming vital to preserving the quality of human life. Potentially dangerous changes are happening in the atmosphere, oceans, animal habitats and places where hazardous materials are used, or have been discarded without adequate environmental protections. Terrorist attacks on buildings, water supplies and agricultural production and processing facilities, including the introduction of new, more virulent forms of animal diseases like anthrax, or spreading contamination in the form of nuclear waste could constitute potentially the most damaging environmental threat of our times.

In recent decades public interest in environmental problems has increased enormously, and research into these subjects has been intensifying. At the same time developments in computer and network techniques have led to the creation of sophisticated information systems with increased storage and transmission capacities. Such data can often be accessed by the public using the internet; and the public has become a very concerned participant in discussions about the environment.

In recent years, information technology has become significant to all scientific groups and fields involved in environment engineering. Knowledge based systems which enable the study of environmental changes have been developed, are being extended to manage those environments. New paradigms for designing objects to enable easy disassembly and recovery of components contribute to reuse. Developments in exploiting alternative energy sources are reducing dependence on nonrenewable resources. Surveillance techniques enable tracking of persons likely to threaten the lives of persons or their environment.

How can these developments be enhanced?

Further advance is going to be possible only if scientific teams have adequate experience, methods and tools for investigation of the changes in the environment. Success requires a high level of organization both related to technical as well as scientific and human aspects of information handling.

The ITEE 2003 conference will provide a forum for exchanging information among pollution engineers, knowledge engineers and scientists. Some of the objectives include discussion of projects for long term storage of data, data update and validation, and the consistency of data. Research topics and funding opportunities discussed at the conference will be of interest to all researches. Another objective is to discuss means of assessing the potential of individual teams in implementation and modelling of large scale systems.

TOPICS to be discussed

1. *Tools and measurement techniques*
   - Water and air pollution measuring
   - Continuous monitoring of gaseous and particulate pollutants using state-of-the-art monitoring equipment
   - Monitoring of meteorological parameters, dust, wet and dry deposition
2. *Formal methods and data processing techniques*
   - Pollution engineering and management
   - Air quality management
   - Environmental and water resource engineering
   - Process studies
   - Chemistry of air pollution
   - Urban and suburban transport emissions
   - Data assimilation and sensitivity analysis
   - Data management
   - Data access via the Internet
   - Coupling of models and databases
   - Updating of model calculation during run-time
   - Data visualisation
   - Data interchange formats and standards
   - Geographic information systems
   - Comparison of modelling with experiments
   - Data analysis and observation
   - Data processing and verification, including database management
   - Data security – data mining
   - Management and distribution of electrical energy
   - Power distribution systems
3. *Modelling and simulation problems*
   - Modelling of atmospheric chemical kinetics (gas and aqueous phases)
   - Chemical transformation modelling
   - Aerosol modelling
   - Mesoscale meteorology

- Urban scale meteorology
- Emission models
- Coupling with radioactive effects
- Numerical simulation of transport
- Numerical simulation of atmospheric chemical kinetics
- Inverse modelling
- Ground water pollution modelling
- Water pollution modelling and prediction
- Urban pollution modelling
- Models for ground water, surface water, storm water
- Risk and environmental modelling
- Soft modelling

4. *Information systems*
   - System management
   - Agent-based systems
   - Planning for environmental engineering (EE)
   - Intelligent systems for environmental engineering (EE)
   - Artificial intelligence and expert systems for environmental engineering (EE)
   - Architectures for building the systems
   - Knowledge based integration
   - Distributed computing environments
   - WWW-based for EE systems
   - Decision support systems – distributed systems
5. *Practical applications and experiences*
   - Practical solutions
   - Systematic guide-lines
   - Case studies, pilot projects and experiments
   - Applications in the cities
   - Application in agriculture

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Venture into New Dimensions

Heraeus Sensor-Nite Presents the Worldwide First Platinum Sensors of the Types SMD 603 in 1 kΩ and 805 in 10 kΩ

Miniaturization and low power are the elementary features dictated by development engineers for state-of-the-art electronic systems. With two world innovations in the area of platinum temperature sensors, Heraeus Sensor-Nite has made a decisive step towards these two goals. The SMD 603 (surface-mounted device) with its dimensions of 1.6 × 0.8 mm has only half the size of its predecessor, and the new SMD 805 is the first platinum sensor of this type to feature a nominal resistance of 10 k Ω. The result is that, on the one hand, higher packing densities on electronic PCBs are achieved or, on the other hand, it is possible to benefit from the full range of advantages of platinum temperature sensors in case of the 10 k Ω variant. This particularly refers to the extremely high measuring accuracy and longterm stability.

Optimizations of carrier substrate and photolithographic production process

Successful optimization of the photolithographic production process and the carrier substrate are the basis for this venture into new dimensions. The extremely fine platinum microstructures require an absolutely planar surface which is not offered by traditional carrier materials. Conductors in meandering structures with a spacing of 6 µm at the best have offered so far the best state-of-the-art technology for platinum temperature sensors. Thanks to Heraeus Sensor-Nite, this value has now been surpassed three times. In both innovations, platinum meander widths and spacings as small as 2-3 mm are achieved. The SMD 603 utilizes this innovative step for further minituarization, whereas in the 10 kW SMD, a higher, optimized nominal resistance is reached.

The platinum SMD 603 – miniaturization and price advantage

For the users of platinum temperature sensors, miniturization of the SMD 603 does not only represent a benefit regarding higher packing densities. Moreover, it is the basis for a substantial price advantage. As a result of the considerably smaller dimensions, clearly higher yields can be accomplished with a standard 2× 2 inch substrate of the 603 series. In combination with numerous process optimizations, which have significantly reduced the production costs in the recent past, pricing is likewise influenced. According to Dr. Karlheinz Wienand, R & D-Director at Heraeus Sensor-Nite, the prices of his new SMD 603 sensors are in the range of technically comparable thermistors.

The Pt SMD in 10 kΩ – benefit from all advantages of platinum sensors

For the evaluation of signals from Pt temperature sensors, voltage divider circuits, operated at 5 V, are normally used. In the ideal case, series resistor and measuring resistor are identical so that an optimum nominal resistance of 8–12 k Ω is achieved. The power loss or the selfheating effect of the sensors is hence so small that it can be neglected, the temperature accuracy reaches tolerance values lower than 0.15%! As a result, the known benefits of platinum temperature sensors can be utilized in their full range:

- Extraordinarily high precision (< 0.15%)
- Virtually linear characteristic
- Very broad temperature range (–196 °C–1.000 °C)
- Low drift
- Extreme longterm stability and reliability
- Easy reproducibility

Dr. Wienand explains the consequences of this development as follows: "This successful breakthrough regarding process optimizations and carrier material paves the way to even finer platinum meandering structures." In his view, it opens up many interesting prospects for the future. The Bavarian market leader announced, for example, an SMD 603 of 10 k Ω for next year.

Heraeus Sensor-Nite GmbH is a company specialized in temperature sensors of platinum thin-film technology. It has a turnover of Euro 12 million in 2001, 110 employees and is headquartered in Kleinostheim, Bavaria. Typical appliances, HVAC and medical equipment.

The Heraeus Holding GmbH precious metals and technology group, headquartered in Hanau, Germany is a globally operating family-owned enterprise active in the areas of precious metals, dental technology, quartz glass, sensors, special light sources and medical technology. The Group's ambition is to be among the world leaders in each of its areas of activity. With a turnover of Euro 6.8 billion in 2001 and a staff of over 9,100 employed at more than 100 subsidiaries and joint ventures worldwide, Heraeus has been a leading player in the precious metals and materials technology sectors for 150 years.

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