Newsletter

Issued on October 8, 2014 No. 13

IEEE Tokyo Section
Life Members Affinity Group

This issue is devoted to three recent lecture meetings (3rd to 5th ones this year) and our technical tour made for the first time. Our activities schedule and "Important notice" from IEEE for maintaining your Life-Membership are described, also.

1. Lectures Celebrating the IEEE Milestone to Line Spectrum Pair (LSP) for High-Compression Speech Coding, 1975

The presentation ceremony of the IEEE Milestone plaque to "Line Spectrum Pair (LSP) for high-compression speech coding, 1975" was held in Palace Hotel Tokyo on Thursday, May 22. The Milestone plaque was presented to Mr. Hiroo Unoura, President and CEO, NTT, from Prof. J. Roberto de Marca, President, IEEE. Citation on the plaque is as follows:

Line Spectrum Pair, invented at NTT in 1975, is an important technology for speech synthesis and coding. A speech synthesizer chip was designed based on Line Spectrum Pair in 1980. In the 1990s, this technology was adopted in almost all international speech coding standards as an essential component and has contributed to the enhancement of digital speech communication over mobile channels and the Internet worldwide.

http://www.ieee-jp.org/japancouncil/jchc/adm/milestone/20LSP.pdf

To celebrate the recognition, a lecture meeting followed from 12:15 to 13:30 under the co-sponsorship with IEEE Tokyo Section with about 100 attendants. The contents are:

1. IEEE Milestone Overview: Dr. Isao Shirakawa, Chair, History Committee, IEEE Japan Council
2. Commercialization of LSP: Dr. Takehiro Moriya, Research Fellow, NTT Communication Science Labs.
3. How the LSP was invented: Prof. Fumitada Itakura, Formerly with NTT Electrical Communication Laboratory, Professor emeritus of Nagoya Univ.

The beginning of LSP was introduced by Prof. Itakura. His invention in 1975 at the NTT Electrical Communication Laboratory was based on the mathematical theory, and is the important technology for speech synthesis and speech coding. In 1980 a speech synthesis LSI chip was developed on the basis of the LSP.

Dr. Moriya explained the commercialization status of LSP. The LSP could reproduce the same speech quality as the directly coded PCM (Pulse Code Modulation), with lower than 1/10 information rate. This made LSP an essential technology for almost all the international standards for speech coding in 1990s. As a result, LSP is globally applied to the second generation mobile telephone system GSM (Global System for Mobile communications) and the third generation one.

2. Technical Tour to JAXA (Japan Aerospace Exploration Agency), and Lecture by Dr. Tachikawa followed by Get-together Party

This event was held on Thursday, July 10, 2014, under the co-sponsorship with IEEE Tokyo Section and the support by IEICE Tokyo Section.

The participants assembled at JAXA Chofu Aerospace Center for the visit from 13:30 to 15:00, and afterwards moved to the University of Electro-Communications for the lecture by Dr. Keiji Tachikawa from 15:30 to 17:00. After the lecture the participants enjoyed the dialogues with the lecturer at the get-together party from 17:10 to 19:00.

a) Technical Tour to JAXA Chofu Aerospace Center

This center has succeeded former National Aerospace Laboratory of Japan, which was merged to JAXA. It puts emphasis on the aerospace research, and is now also responsible for JAXA supercomputer development and numerical simulation studies.

About 40 visitors first watched the introduction video of the center, and then visited in 2 groups the exhibition room, YS-11 (the first home-made middle scale airplane after the WWII), and the supercomputer. The supercomputer was just being replaced to 3.4 peta-FLOPS system. Several numerical simulations on rockets, reentry capsules for transfer vehicle to space station (HTV), supersonic transports, low-noise helicopters and others were demonstrated.

Participants visiting cockpit of YS-11

It was a great opportunity for the participants to learn R&D supporting aerospace and aircraft technologies in Japan.

b) Lecture by Dr. Tachikawa

Dr. Keiji Tachikawa gave a lecture entitled as "Space Development in Japan and Its Future Prospects" on the basis of his experiences as Chairman of JAXA from November, 2004 to March, 2013. There were approximately 80 participants, and the key points of the lecture are shown below.

The first Japanese home-made rocket H-II was successfully launched in February 1994, but its cost was about two times as high as the overseas market price of around ten billion yen. At that time, H-IIA rocket was in the process of development for 50% cost down. In 1998, a launching failure of H-II happened, and in 1999, another failure happened. So, H-II rocket project was discontinued, and the effort was concentrated on the development of H-IIA rocket.

The test launching of H-IIA rocket was a success in August 2001. Since then, all 22 H-IIA rockets were launched without failure until January last year. Also, H-IIB empowered with solid fuel boosters, a successor of H-IIA, was launched successfully three consecutive times from September 2009 to July 2012. The H-IIB is capable of launching a satellite of 8 tons to a geostationary orbit, and of 19 tons to a low orbit. The cost competitiveness of H-IIB has become equal to that of overseas.

During his term as Chairman of JAXA, no failure in rocket launching occurred, and the reliability of Japanese rocket technologies highly progressed by various measures he promoted. The key to this great success was to encourage and promote the use of system engineering. The concrete examples were as follows: He established a special section in charge of this function, and Chief Engineer system effective for clear responsibility. Other issues he promoted were the enforcement of the technical evaluation by independent professional teams, the systematic accumulation of technical information and experiences, its effective use, and the human resources development.

In his lecture Dr. Tachikawa also introduced earth observation satellites, communication satellites, validation satellites, and space science satellites like “KAGUYA” and “HAYABUSA”. He referred also to the international contribution of the Japanese experiment ridge “KIBOU” of International Space Station, the H-II transfer vehicle “KOUNOTORI”, and activities of Japanese astronauts. Lastly, he explained JAXA’s activities toward promotion of people’s understanding for space development, including special activities toward encouraging scientific interest of primary and secondary school pupils.

After his lecture, active discussion was carried out. He explained the background where Japanese rocket launching has not failed recently, and his view regarding quasi-zenith satellites.

Lecture by Dr. Tachikawa

c) Get-together Party

After the lecture, a party was held at the university restaurant, and the participants had informal talk with Dr. Tachikawa.

3. Lectures Celebrating the IEEE Milestone to Meidensha Surge Arrester (MOSA), 1975

The presentation ceremony of the IEEE Milestone plaque to Meidensha surge arrester was held in Grand Prince Hotel Shintakanawa on Monday, August 18. The Milestone plaque was presented to Mr. Yuji Hamasaki, President, Meidensha Corporation, from Prof. J. Roberto de Marca, President, IEEE. Citation on the plaque is as follows:

Gapless Metal Oxide Surge Arrester (MOSA) for electric power systems, 1975

Meidensha Corporation developed MOSA and its mass production system by innovating on Panasonic Corporation’s ZnO varistor basic patent. MOSA dramatically raised performance levels against multiple lightning strikes and contamination, and led to UHV protective device development. This technology contributed to improving the safety and reliability of electric power systems and to establishing international standards.

http://www.ieee-jp.org/japancouncil/jchc/adm/milestone/22mosa.pdf

To celebrate the recognition, a lecture meeting followed from 13:45 to 15:00 under the co-sponsorship with IEEE Tokyo Section. The contents are:

1. IEEE Milestone Overview: Dr. Isao Shirakawa, Chair, History Committee, IEEE Japan Council
2. Birth of Gapless Metal Oxide Surge Arrester and Early Days of Its Promotion Activities: Mr. Misao Kobayashi, Representative of Surge Protect K.K.
3. Technology Trend in Zinc Oxide Surge Arrester: Mr. Masayuki Takada, Sorester Factory, Meiden-sha Corporation

In Lecture 1, it has been introduced that this recognition is the 147th in the world and the 22nd in Japan. In the third lecture, various topics were covered ranging from working principle of MOSA to its most recent development. In the following, the summary of the second lecture is published, which is contributed by Mr. Misao Kobayashi, IEEE Life Fellow and member of LMAG Tokyo.

a) Introduction (in Brief)

In the 1970s, the serious challenges for world surge arrester industry were: improvement of reliability, more compact design, and capability for UHV application. In 1967, Matsushita Electric Industrial Co., Ltd. (present 'Panasonic Corporation') made an epoch-making discovery on varistors for household electric appliances. Meidensha Corporation ("Meiden") made a joint research project with Panasonic, and on that basis, Meiden developed and commercialized Gapless Metal Oxide Surge Arrester (MOSA) for electric power systems. MOSA had to go through the process of international standardization starting from technical discussions at CIGRÉ (Conseil International des Grands Réseaux Électriques (in French)/The International Council on Large Electric Systems (in English)) before JEC Standard (1984), IEEE Standard (1987) and IEC Standard (1991) were established. On the other hand, MOSAs became the major choice (de facto standard) for surge arrester for electric power systems, and since 1977, they have been used worldwide even before the international standards were drafted. I would like to give you a snapshot of how it was like back then (our inventions, difficult moments, efforts, and good memories). Also, I'd like to tell you my thought and opinion about why Meiden could make it, not bigger heavy electrical companies in Japan doing the surge arrester business.

b) Background of Development at Meiden and Penetration at Home and Abroad (Main Text)

Back in 1970, conventional gapped type surge arresters were mostly used. They consisted of SiC resistor elements (non-linear resistor) and spark gap in-series and were enclosed in insulation housing (porcelain enclosure). The SiC resistor elements did not have sufficient voltage and current nonlinear characteristics. In order to prevent the heat generation or resultant burnout damage by the effect of the resistive current (dozens~several hundreds of ampere) under continuous operating voltage, the use of in-series gap was a must. Therefore, the burnout accidents caused by the multiple lightnings and housing surface contamination (e.g. contamination by salts or dust) were unavoidable in principle. The conventional gapped type surge arresters could not fully meet with the demands of the high information society of "no outage". These defects remained as issues which could not be solved in the world surge arrester industry.

Meiden's President Hiraki at that time saw a newspaper press release that Panasonic's metal oxide varistor (whose main ingredient was zinc oxide (ZnO)) for light electric appliance might be applicable for electric power systems application (May, 1970). Meiden contacted Panasonic and started the joint research program of metal oxide varistor for electric power systems. After the success of the joint research program, we received a patent license from Panasonic by the agreement, and then embarked on the self-development program of ZnO elements for electric power systems. Together with Panasonic, Meiden announced the world-first technical paper on 66kV MOSA at the national convention of the Institute of Electrical Engineers of Japan (IEEJ) in 1973. In 1975, we supplied the world-first 66kV MOSA for Hayato Substation of Kyushu Electric Power Co., Inc. This record became the subject of IEEE Milestone Award, which Meiden received this time.

Based on the positive results of the first supply record, since 1977 in Japan, each electric power company came to adopt the MOSAs gradually. In 1979, the standardization work of JEC in Japan kicked off, and in 1984, the world-first MOSA standard, JEC-217, was established.

Lecture by Mr. Misao Kobayashi

c) Commercialization and Efforts for Wider Market Penetration (Strategy, Hard days and My memories)

Regarding the commercialization and market penetration programs, they went side by side with the R & D programs at Meiden. The people in the sales front faced the "Chicken and Egg Issue" (The customers would ask: "Do you have a track record of such product?" Our reply would be: "Without the first adoption by any power utility, how could we make a

track record?"). As a measure, we proposed and implemented joint research programs with the major power utilities in Japan to meet the needs of their major requirements. After gaining the field experiences and track records, we promoted the MOSA standardization in Japan and along the way, we supplied world-first MOSA products. Through these efforts, we could come to tell how to get there with the JEC standardization on MOSA. For the promotion of IEC standardization, we attempted to serialize the MOSA products for 3.3-275-kV power systems. After conducting the open type tests for all power utilities in Japan using the internal technical specification draft used at Meiden, I contributed a technical paper to 1977 IEEE SM (Mexico Meeting) using the results of such open type test. We promoted the technical discussions at CIGRÉ and IEC. However, as I mentioned earlier, it took some more years until IEEE standard and IEC standard were established.

These activities were evaluated. I received many honors, such as various awards at home and abroad (The Okochi Memorial Award, Medal with Blue Ribbon (national medal given to an individual contributing for the benefit of public interest), IEC1906 Award (recognition of exceptional current achievements of experts), etc.), and was nominated as 'CIGRÉ Distinguished Member', and 'IEEE Fellow'. Moreover, I could have and still have the friendly contacts with key members of CIGRÉ SC33, IEC TC37, and IEC TC28 during my active days. I still reminisce about those days.

d) Conclusion (Closing Remark)

One of the frequently asked questions (FAQs) from academia or industrial circle is "Why could Meiden, a midsized heavy electrical company, make such a great invention?" I thought about it and came to a personal conclusion as below. As old Japanese saying goes, "From the ancient period, there are three key factors for success (KFSs): Timing from Heaven, Advantage of the Land (being there), Harmony among People (serendipity by the people's connections). My conclusion is: "A miracle happened. The three KFSs got together by chance." Such a case happens very, very rarely. "We were very much blessed." Another luck was: I happened to be one of the key project members for MOSA development programs. I thank God for my luck!

4. Important Notice

Your Life-Membership is maintained by briefly reporting your status each year as shown at:
http://www.ieee.org/societies_communities/geo_activities/life_members/life_members_benefits.html

Every year in the latter half of October you will be asked to reply to the simple questions sent by snail-mail from IEEE. You can also respond by email.
http://www.ieee.org/societies_communities/geo_activities/life_members/lm_profile.html

5. Event Information

a) IEEE Workshop on Japanese Industry Promotion

IEEE Japan Council is organizing this workshop as the first step for promoting engineers/practitioners working in industries to play an active role in the global business. It will be held on November 8th and 9th and LMAG Tokyo is cooperating. Details are shown in the following web page:
http://www.ieee-jp.org/IPCWS.pdf

b) Lectures Celebrating the IEEE Milestone to KDDI "Trans-Pacific Submarine Cable System TPC-1, 1964"

Sponsor: IEEE Tokyo Section
Co-sponsor: LMAG Tokyo and others
Date: November 12 (Wed.)
Details will be announced soon.

6. Call for Contribution

Your contributed articles are always welcome. Please contact to the secretariat <tokyosec@ieee-jp.org>

IEEE Tokyo Section Life Members Affinity Group Newsletter Issued on October 8, 2014 No.13
Issued by IEEE Tokyo Section Life Members Affinity Group
Kikai-Shinko-Kaikan Bldg., 517
3-5-8 Shibakoen, Minato-ku, Tokyo 105-0011 JAPAN
URL: http://www.ieee-jp.org/section/tokyo/lmag/index.htm
E-Mail: tokyosec@ieee-jp.org