Asian Concrete Federation Newsletter

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# ACF co-organized YRGS2012

ACF co-organized the 4th Asia-Pacific Young Researchers and Graduates Symposium (YRGS2012): Future of Structural Engineering – Research, Practice and Education on December 4-5, Hong Kong. The YRGS2012 was chaired by Dr. Jian-Guo Dai, an active ACF member, together with his colleague Dr. Songye Zhu at the Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University. The Hong Kong Institute of Steel Construction (HKIC) also sponsored this event.

The YRGS2012 accepted 47 papers from many countries/regions including Australia, Canada, Mainland China, Hong Kong, India, Japan, Korea, Malaysia, USA, UK, Taiwan, Thailand and Turkey. The symposium consisted of a two-day technical program. The first day program was organized in six technical sessions and the second day program was organized in the form of a mini-symposium on "Durability and Life-cycle Management of Civil Infrastructures", which was particularly organized for YRGS2012 participants in conjunction with the First International Conference on Performance-based and Life-cycle Structural Engineering (PLSE2012), 5-7 December 2012, Hong Kong. Many young ACF members joined both events.


Group photo of YRGS2012

The YRGS series is primarily a platform for early-stage structural engineering professors, research scientists, professional engineers, postdoctoral fellows and PhD students to present their latest findings within the broad discipline of structural engineering. It provides a good opportunity for Asia-Pacific young structural engineering people to learn about future career paths, to network with fellow researchers and to develop collaborations and friendship. The previous three YRGSs were successfully held at Kunsan National University in 2009, Zhejiang University in 2010 and National Taiwan University in 2011, respectively.

The ACF president, Prof. Tamon Ueda from Hokkaido University, was invited by the YRGS2012 organizing committee to deliver a keynote lecture titled "Expectation to Young Research in Asia-Pacific for Our Future". Prof. S. P. Shah from Northwest University, USA delivered the other keynote lecture on "Advanced Materials through Nanotechnology".


Prof. Ueda's Keynote lecture

Prof. Shah's Keynote Lecture

During the YRGS2012, Prof. Ueda expressed his strong wishes that young researchers in the Asia-Pacific region should enhance communication, collaboration and academic exchange, and foster leadership through active involvement in professional bodies such as ACF. The steering committee of YRGS decided to organize some particular events (e.g. special sessions and workshop) during the biannual ACF conference and hopes that ACF will continue supporting the YRGS activities. It is expected that a closer partnership between YRGS and ACF will benefit the growth of younger researchers and professionals in the structural engineering field, which is also one of the aims of the ACF. It was decided that the next YRGS symposium will be organized in India in 2013.

Dr. Jian-Guo Dai
Department of Civil and Environmental Engineering
The Hong Kong Polytechnic University

# Brief history and future expectation of ACF Sustainability Forum

Prof. Koji Sakai
Chair, ACF SF
Faculty of Engineering
Kagawa University

In 2010, ACF adopted the "ACF Taipei Declaration on Sustainability", which is summarized into the following six items:

1. ACF recognizes the importance of the Asian concrete society's role in achieving global sustainable development as the consumption of concrete keeps increasing.
2. ACF realizes the need for sustainable development by reducing resource consumption and carbon footprint in the life cycle of a concrete structure.
3. ACF encourages the concrete industry to make efforts for the well-being of human society by providing safe, serviceable, and environmentally-friendly structures.
4. ACF promotes the concrete industry to employ the best technologies and make technical innovation in the future for sustainable development.
5. ACF informs the concrete industry and the public of the importance of concrete structures in sustainable development.
6. ACF collaborates on sustainable development with other international associations in the concrete society.

ACF Sustainability Forum (ACF SF) was established to follow up the Taipei Declaration on Sustainability, and during its first forum meeting held in April 2011 in Bangkok, Thailand, members especially discussed what should be done to promote it. As the result, they agreed upon the following activity plans.

1. Collection of stochastic data on resources and $CO_2$
2. Clarification of barriers to sustainable development
3. Clarification of industry's social responsibility
4. Dissemination of the latest information through seminars
5. Development of documents which show the importance of concrete/construction industry
6. Collaborations with world's leading organizations

TCA-ACF Joint Seminar was organized during the first forum meeting as the first activity to exemplify No. 4 above.

At the second forum meeting held in November 2011 in Seoul, South Korea, the current statistical data of the concrete industries in member countries was reported based on questionnaire survey. The report revealed that not a few countries have difficulties in collecting basic data, because of the absence of concrete-related organizations, and in case of Indonesia, because of the absence of the concrete association in the country. In spite of the difficulties, members agreed to continue the research activities.

During the third forum meeting held in April 2012 in New Delhi, India, following the meeting in Seoul, participants summarized the statistical data and reported the current situation on sustainability in each country. In addition to the forum meeting, the ICI-ACF Joint Seminar entitled "Green Concrete Technologies for Sustainable Concrete Construction" was held for two days. Prof. Donguk Choi from South Korea and Dr. Takafumi Noguchi from Japan, both secretaries of the SF, and the author made presentations at the seminar. As an enormous amount of infrastructure is expected to be built in India, sustainability technology will play a vital role in the concrete/construction industry. In other words, India will be the key for achieving the goals of the ACF Sustainability Declaration. Therefore, close partnership between ACF SF and ICI will become even more important in the future.

Then, the fourth forum meeting was held on October 25, 2012, in Pattaya, Thailand. Again, participants summarized the current state of activities on sustainability in their respective countries after reconfirming the activity plan of ACF SF. Representatives from India, Indonesia, Japan, South Korea, Thailand, and Vietnam gathered together at the meeting. Following the introduction of various data, the delegate from India reported that the chapter related to sustainability would be added to the national construction standard of India, and the establishment of green guidelines for RMC plants was scheduled. Indonesian delegate reported that the annual cement consumption in the country was 46.8 million tons, with blended cement accounting for 80% of the total cement consumption. The cement demand in Indonesia shows a 12% increase every year, and the standardization and investigation into environmental assessment systems for the use of blended cement is underway. From Japan, JCI's activity on sustainability including the Concrete Sustainability Declaration announced by seven concrete-related organizations in April 2012 was reported. South Korea reported the plans to reduce $CO_2$ emissions from its construction industry, such as the introduction of performance-based specifications and environmental design, 10% replacement of cement with supplementary cementitious materials, labeling of the environmental performance of products for building construction, standardization of environmental labels, and creation of a LCI database, as well as the revision of the first chapter of its architectural standard to advocate reduction in global warming gases and building demolition waste and promotion of the use of recycled materials. Thailand presented a calculation manual for $CO_2$ emissions including methods of demarcating system boundaries and calculating inventory data, as well as the results of case studies based on the manual, which demonstrated large differences among inventory data. From Vietnam, the amount of the concrete-related resources and cement/concrete output in the country was reported. Vietnamese delegate also referred to the designation of areas where mining of construction resources is prohibited in order to protect the landscape. In this manner, the Pattaya meeting turned out to be the occasion for the members to recognize that the activities of ACF SF have finally got on the right track.

At the end of the meeting, the Chair called for the establishment of related mirror committees in respective countries and the preparation of a draft report based on research in respective countries by the next meeting, so that the activities of ACF SF will become more efficient. ACF SF also requested the Indonesian delegate to make efforts to establish the Indonesia Concrete Institute. It was also decided that the next meeting would be held on March 8, 2013, in Ho Chi Minh, Vietnam, with seminars being scheduled on the following day. As to the meeting after that, arrangement is now in the process to be held in the autumn of 2013 in Indonesia.

Participants of the SF Pattaya meeting

# Election result of the new Executive Committee members

Next EC members **(term of office; Jan. 2013 – Dec. 2014)** have been nominated by each representative members, and among the new EC members, the next president was elected during the EC meeting held on October 23 2012 in Pattaya, Thailand.

President;
Prof. Tamon Ueda (Japan Concrete Institute)

Vice-president (policy);
Prof. Manyop Han (Korea Concrete Institute)

Vice-president (technical);
Prof. Somnuk Tangtermsirikul (Thailand Concrete Association)

Treasurer;
Prof. Yin-Wen Chan (Taiwan Concrete Institute)

EC members;
Mr. Jose Kurian (Indian Concrete Institute)
Prof. Benjamin Lumantarna (Indonesian Society of Civil and Structural Engineers)
Mr. Khashchuluu Adiya (Mongolian Concrete Association)
Dr. Bahador Sabet Divsholi (Singapore Concrete Institute)
Dr. Nguyen Van Chanh (Vietnam Concrete Association)
Prof. Taketo Uomoto (Ex-officio; TB Chairman)
Prof. Jongsung Sim (Ex-officio; immediate past president)


EC members


Technical Board Meeting, October 26, 2012

# New Technical Board members

As the term of current ACF Technical Board office expires by the end of this year, the election of new TC chairmen and TB chairman **(term of office; Jan. 2013 – Dec. 2014)** was conducted among TC/TB members in October 2012.

With the confirmation and approval of Prof. Sim, the immediate past chairman of ACF and witness of the election, the next TB members were officially announced as below:

TB Chairman;
Prof .Taketo Uomoto, Public Works Research Institute, Japan

TC1 Design Chairman;
Dr. Dai Jianguo, The Hong Kong Polytechnic University, Hong Kong

TC2 Materials and Construction Chairman;
Dr. Takafumi Noguchi, University of Tokyo, Japan

TC3 Maintenance Chairman;
Prof .Hiroshi Yokota, Hokkaido University, Japan

Editorial Committee Chairman;
Dr. Sanaul Chowdhury, Griffith University, Australia

# The 5th International Conference of Asian Concrete Federation (ACF2012)


The 5th ACF International Conference
October 24-26 2012
Pattaya, Thailand

The 5th International Conference of Asian Concrete Federation (ACF2012) was held successfully at Amari Orchid Pattaya Hotel, Pattaya City, Chonburi, Thailand on October 24-26 2012, jointly hosted by ACF, Thailand Concrete Association (TCA), Faculty of Engineering, Chulalongkorn University (100th anniversary celebration) and Sirindhorn International Institute of Technology (SIIT), Thammasat University (20th anniversary celebration). The main theme of the conference was "Novel Concrete Technology for Environmentalism-conscious Design, Material, Construction and Maintenance".

On October 24, 2012, Prof.Tamon Ueda, ACF President gave an opening speech.. Assoc. Prof. Dr. Boonsom Lerdhirunwong, Dean of Faculty of Engineering, Chulalongkorn University and Prof.Somnuk Tangtermsirikul, Director, SIIT, Thammasat University gave the welcoming speech during the opening ceremony. Afterward, keynote papers were presented by the 5 distinguished invited speakers; Prof. F.X. Supartono from Indonesia, Prof. Taketo Uomoto from Japan, Pro. Keun Joo Byun from Korea, Prof. Jenn-Chuan Chern from Taiwan and Mr. Athaporn Singhawichai from Thailand in the topic of "Experiences, preventions and post-management of natural and man-made disasters".

During the second and third day of the ACF2012, 111 papers from 13 different countries/regions were presented in 14 parallel sessions. The number of participants was around 180. Topics of papers were in the field of Concrete and Aggregates, Additives and Admixtures, Pozzolans, Lightweight Concrete, High Performance Concrete, Durability of Concrete, Life Cycle Cost and Management, Repair and Maintenance of Concrete, Environmentalism-conscious Design, Green Concrete, and Mega Projects and International Cooperation.

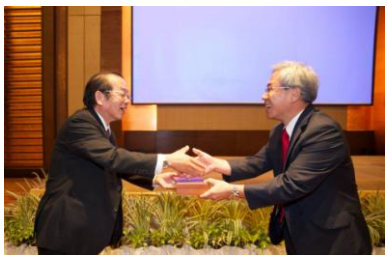
As the co-events of the conference, ACF Executive Committee Meeting was held on October 23 , Sustainability Forum on October 24, and Technical Committee Meeting on October 26, 2012. Presidents of national concrete institutes and professors from Thailand, Korea, Vietnam, Indonesia, Japan, Taiwan, and Mongolia attended the ACF Executive Committee Meeting. The objectives of the meeting are to discuss future activities of ACF regarding technical committee activities, international standard publications, international conferences and sustainability forum, etc.

The next ACF International Conference will be held in Seoul, Korea in 2014.

Local Organizing Committee
The 5th International Conference of Asian Concrete Federation (ACF2012)


Welcoming Speech: Assoc. Prof. Dr. Boonsom Lerdhirunwong, Dean of Faculty of Engineering, Chulalongkorn University


Welcoming Speech: Prof.Somnuk Tangtermsirikul, Director, Sirindhorn International Institute of Technology, Thammasat University



Prof.Taketo Uomoto and Prof.Donguk Choi

# Kajima Group applied most advanced and environment-friendly technologies to rebuilding its Technical Research Institute

(http://www.kajima.co.jp/tech/katri/index-j.html)
Mr. Hiro Nakagawa, Kajima Corporation

The Kajima Group is one of Japan's largest general contractors. Established in 1840 and headquartered in Tokyo, the Kajima Group has more than 15,000 employees, serving customers in over 20 countries. For the fiscal year ended on March 31, 2012, its consolidated revenues totaled 1,458 billion yen.
Upholding its reputation as a technology-driven company, Kajima is responding to customers' increasing complex and diverse needs by tremendous R&D works at its industry-leading Kajima Technical Research Institute (KaTRI) which was established in 1949 as the first technical research institute in the construction industry in Japan. Through comprehensive research and development at KATRI, Kajima Group continues to lead the new market creation, encouraging higher competitiveness, and boosting the profitability as well as ensuring quality.

Main Complex with headquarters
Total site area: 11,847m$^2$

Nishi-chofu Complex with large-scale testing facilities
Total site area: 21,871m$^2$

Kajima has moved forward with rebuilding KaTRI using the most advanced construction technologies and completed the "Research and Administration Building (Main Complex)" in November 2011. In rebuilding KaTRI, Kajima has made the low-resource and high-performance construction, a crucial point to cope with the severe economic conditions that society is currently facing, a reality. Positioned as one of the main leading projects in our ultimate attempt to realize a zero energy emission building, Kajima's goal is to cut the $CO_2$ emissions by 50%.

Research and Administration Building (Main Complex)

Kajima is working comprehensively to develop over 20 new technologies through on-the-spot experiments at the Research and Administration Building. These include a ductless HVAC (heating, ventilation and air conditioning) system equipped with ceiling air jets, recycled aggregate concrete as well as the planting and evapotranspiration-promoting rooftop greenery based on Ecological Network evaluation techniques.
Recycled-aggregate concrete, in which demolished concrete debris is used as a recycled aggregate, is a resource-saving technology among low environmental impact technologies. A total of 183m$^3$ of recycled aggregate concrete have been applied to various structural members including columns, walls, floors and retaining walls. Production of recycled fine aggregate with the conventional technologies showed a limitation because huge processing technology was required to ensure the quality of the fine aggregate. The technology developed and put into practical use is the production of mid quality recycled fine aggregate for building use. The quality level is not as high as that of the normal aggregate but the processing energy can be largely reduced. In addition, a high quality recycled fine aggregate applicable to the construction of electric power plant was developed using a custom-made rotary drum mill. It is the first-time in Japan that the mid quality recycled fine aggregate was applied to the upper structure of buildings. It is expected that the actual application to the building and the certification issued by the Minister of Land, Infrastructure, Transport and Tourism of Japan will ensure further development and dissemination of these technologies.

A column and wall built with recycled aggregate concrete

Retaining wall built with recycled aggregate concrete

# The new ecological concrete brings $CO_2$ emissions to below-zero level --The new method for $CO_2$ capture and storage--

Dr. Minoru Morioka
Denki Kagaku Kogyo Kabushiki Kaisha

The reduction of greenhouse gases has become a crucial issue in various industries in Japan. According to the Kyoto Protocol, Japan is obligated to reduce its greenhouse gas emissions (estimated at 1,260 million tons in 1990) by 6% by the year 2012. The electric industry accounts for approximately 30% of the $CO_2$ emissions in Japan. Therefore, the enhancement of thermal efficiency in power stations and expansion of the recyclable energy such as hydro power, solar power and wind power has been promoted.

On the other hand, some efforts have been made to reduce $CO_2$ emissions even in the concrete fields in Japan. A large amount of $CO_2$ is emitted during the production of cement. For this reason, using industrial by-products like fly ash or granulated blast-furnace slag with a small amount of $CO_2$ emissions, in replace of cement is the main method to reduce $CO_2$ emissions in concrete fields. For instance, according to the Japan Society of Civil Engineers (JSCE), the amount of $CO_2$ emissions can be reduced about 15% by using fly-ash cement type B, and up to 40% by using blast-furnace slag cement type B.

Tremendous efforts have been made in the development of a new ecological concrete that can achieve $CO_2$ emission levels below zero by capturing $CO_2$ emitted from power stations in concrete products.

This ecological concrete is developed based on two special features. The first feature is the use of a special admixture named *Dicalcium Silicate γ* phase (*γ-2CaO.SiO₂*) instead of cement. This material has a very low level of $CO_2$ emissions, and hardens by reaction with $CO_2$. The quantity of $CO_2$ emitted during production is about one-fifth of the ordinary Portland cement.

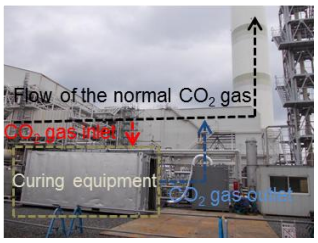
Since *γ-2CaO.SiO₂* does not react with water, it does not have strength development for ordinary concrete. However, when it reacts with $CO_2$, it has strength development greater than that of ordinary Portland cement. Moreover, this concrete uses coal-ash instead of cement. As a result, this concrete not only helps reduce the amount of $CO_2$ emitted from power stations, but also enables the effective use of industrial by-products like coal-ash.

The other special feature of this concrete is the capture of $CO_2$ content in the exhaust gas of power stations. After manufacturing, products of this concrete are put into chamber and exhaust gas full of $CO_2$ is drawn in so that $CO_2$ content in the exhaust gas is captured in concrete. In our test, the initial $CO_2$ concentration in the exhaust gas was about 15% to 20% ($CO_2$ concentration in air is about 0.04%) while that in the exhaust gas after passing through the chamber dropped to 11 to 13%.

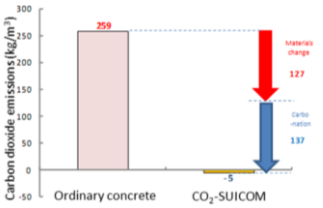
The $CO_2$ emissions of this concrete can be reduced to 120 to 250kg/m$^3$ compared to the ordinary concrete, by using *γ-2CaO.SiO₂* and coal-ash. Moreover, 100 to 200kg/m$^3$ of $CO_2$ are captured in the hardening process of this special concrete. Totally, $CO_2$ emissions of this material can be below zero.

Mechanical properties of the developed concrete are greater than that of ordinary concrete. For example, this concrete has high resistance to abrasion compared to the ordinary concrete. Furthermore, it has high resistance to leaching. Since the developed concrete has low alkalinity compared to the ordinary concrete, it can be said that this concrete has minimal effect on the ecosystem.

This ecological concrete was named "$CO_2$-SUICOM" which is the abbreviation of "$CO_2$ Storage under Infrastructure by Concrete Materials". It is the first of this kind in the world.



Curing equipment of $CO_2$-SUICOM



$CO_2$ gas emission comparison


A $CO_2$-SUICOM panel

"$CO_2$-SUICOM" is the outcome of collaborative works between three firms, namely the Chugoku Electric Power Co., Inc., the Kajima Corporation, and Denki Kagaku Kogyo Kabushiki Kaisha. The above photo shows a panel made by $CO_2$-SUICOM technology.

# VCA-JSCE-JETRO Joint Seminar on Concrete Technology

Dr. Phan Huu Duy Quoc, Shimizu Corporation


Lecturers from Japan posed for a photo together with VCA officials (L-R: Dr. Quoc, Prof. Kawano, Dr. Taniguchi, Mr. Hung (VCA's vice president), Prof. Maruyama, Dr. Watanabe, Dr. Tsubokawa, Dr. Yamaji, Mrs. Hao (VCA's secretary), Mr. Obatake)

Approximately 240 participants attended the opening session

Vietnam Concrete Association (VCA), Concrete Committee of Japan Society of Civil Engineers (JSCE) and Japan External Trade Organization (JETRO) have jointly organized a seminar for the introduction of JSCE Concrete Specifications and up-to-date concrete technologies on September 25-26 2012 in Hanoi, Vietnam.

The JSCE Standards Specifications for Concrete Structures was firstly developed in 1931 and has been periodically updated every 5 years since then. Though JSCE recently translated this document into English for introducing it to international users by different ways including making it available for free internet download, this is the first time JSCE experts directly introduced it to overseas users through a seminar.

Japan Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Vietnam Ministry of Construction (MOC), Ministry of Transportation (MOT) and Federation of Civil Engineering Associations (VFCEA) strongly supported this event by sending their experts and providing valuable logistic supports.

The number of approximately 200 participants indicates the Vietnamese engineers' thirst for information on concrete technologies for rapid development of infrastructures. Experts from Japan also shared with Vietnamese engineers Japan's painful lessons in the past (for example, the durability problem) during rapid development of infrastructures in Japan, hoping that Vietnam will not face the same problems in the future.

In the past, VCA successfully organized 2 joint seminars on concrete technologies, together with ACF and Japan Concrete Society (JCI) in 2009 and 2011.

## Membership fee

Members are kindly reminded to pay their membership fee. Please contact the secretariat in case you have any query about your membership status.

## Secretariat

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## Newsletter

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