



Kuwait Chapter

Concrete News

- Annual Awards 2012-2013
- Magnetized Water Concrete and Sustainability Seminar
- Infrared Thermography
- Jahra Road Development Project

Volume 16
January - December 2013



Kuwait Chapter

Local Connection with International Links

■ Concrete News

Concrete News is published by ACI-Kuwait Chapter for sharing information, promoting exchange of technical knowledge among members, and enhancing the Chapter's position within Kuwait's engineering fraternity.

■ ACI Kuwait Chapter

The purpose of the Chapter is to help in furthering the chartered objectives of the American Concrete Institute. The American Concrete Institute (ACI), is a nonprofit international organization that promotes improved technology, technical competence, design, and construction aspects related of concrete for the benefit of society.

ACI-Kuwait Chapter was established essentially to promote education, standards of technical practice, scientific investigation and research in concrete technology. The Chapter also aims to channel efforts of its members towards a non-profit public service in collecting, correlating and disseminating information for the improvement of design, construction, manufacturing, utilisation and maintenance of concrete products and structures.

■ Functions

ACI Kuwait Chapter is approved and authorized by the Board of Directors of ACI International to provide the means of furthering the chartered objectives of the Institute in the State of Kuwait. The Chapter is managed by a local Board of Directors whose members serve as Chapter Officers. Chapter membership is open to individuals and organizations with an interest in any aspect of concrete technology. The Chapter is operated through its Committees, which are comprised up of volunteers from the membership. Programs are developed by the Committees to help achieve Chapter objectives and to meet the needs of its members. The Chapter may hold several meetings each year and engage in activities that may include:

- Sponsoring educational seminars, short courses or technical workshops.
- Organising or sponsoring training courses for examinations and certification.
- Publishing technical information and newsletters.
- Conducting awards programs for local concrete structures and related distinguished services.
- Special social events.

■ Benefits

Chapter members can attend seminars, short courses and workshops organized at reduced fees.

Free use of ACI publications supplied by ACI International, and which are kept in the Chapter library.

A forum for members to interact with colleagues and identifying potential sources for cooperation in addressing specific technical problems.

■ Joining ACI Kuwait Chapter

To become a member of ACI Kuwait Chapter, complete the membership application form printed on the last page of this publication. Different categories of membership are available. You will receive a copy of the Chapter Bylaws upon becoming a member. The functioning of ACI Kuwait Chapter is based on mutual interest and voluntarily effort. Its success depends upon the active participation of its members.

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■ President's Message



ACI-KC President, Dr. Saud Al Otaibi

I am pleased to have this issue in your hands after an unavoidable short interruption. After this pause, we have attempted to come back with the current issue of Concrete News that reflects changes in presentation and content. The hope is that more technical activities and informative articles will be added in our forthcoming publications. I strongly believe that this cannot be achieved without lively interaction and active participation of our colleagues. We are fortunate in Kuwait to have a melting pot of expertise and knowledge in construction disciplines, and concrete practice in particular. I am confident that there are many subjects and actual cases that can be discussed and presented in excellent article formats to share among us and achieve a major objective of ACI, which is to disseminate knowledge.

Year 2013 has indeed been very eventful for ACI-Kuwait Chapter, with an exciting mix of social and technical activities providing opportunities for networking amongst our colleagues. The highlight was the Annual Awards Ceremony, which was held under the patronage of His Excellency, Eng. Abdulaziz Al-Ibrahim, the Minister of Electricity and Water and State Minister for Municipality Affairs. We have introduced two new awards this year. As an attempt to include an important sector of the construction industry in Kuwait, which is the residential housing sector, an Outstanding Villa Award was introduced. We also presented a Special Recognition Award to an individual who has contributed tremendously to the ACI Kuwait chapter. All awards are extensively covered in this latest issue of our Chapter's bi-annual magazine.

I am looking forward to the new year with a lot of optimism; and I should take this opportunity to wish you all well for your professional careers and personal lives.

■ Chapter Organization

■ Board of Directors

Members of the Board of Directors are elected by Members of the Chapter after being nominated by the Nomination Committee; the Board of Director comprises eleven members. The terms of office of the President and the Vice-President cover a maximum of one year. Directors are elected every year to serve three-year terms.

President	:	Dr. Saud Al-Otaibi
Vice President	:	Mr. Musa Al-Sarraf
Past President	:	Mr. Bader Al-Salman
Past President	:	Mr. Ali Abdullah
Past President	:	Dr. Moetaz El-Hawary
Director/Secretary	:	Mr. Mansoor Rao
Director /Treasurer	:	Mr. Abdul Wahab Rumani
Director	:	Dr. Hasan Kamal
Director	:	Dr. Khaldoun Rahal
Director	:	Mr. Aziz Mamuji
Director	:	Mr. Mohammad Harb

■ Technical Committee

Identifying technical topics of interest to Chapter Members and arranging seminars, short courses and workshops on various topics.

Reviewing and submitting to Chapter Members, ACI International committee reports on subjects of relevance to Kuwait.

Reviewing proposed revisions of ACI Standards and submitting comments to the Chapter's Board of Directors for submission to ACI International.

Promoting local research and testing programs to resolve technical issues of importance for durable concrete construction in Kuwait

Chairperson	Dr. Moetaz El-Hawary
Member	Dr. Zafer Sakka
Member	Dr. Khaldoun Rahal
Member	Mr. Abdel Wahab Rumani

■ Membership Committee

Recruiting new individual members and organizations.
 Issuing and renewing membership identity cards.
 Publishing and updating Chapter's membership directory.
 Facilitating interaction amongst members and communicating their concerns to the Board of Directors and other committees.
 Establish a Students' Chapter and run its affairs.

Chairperson	Mr. Mansoor Rao
Member	Mr. Abdel Wahab Rumani
Member	Mr. Hasib-ur-Rehman

■ Publication Committee

Publishing the periodic newsletter covering the Chapter's activities and providing general information of use to Chapter members.
 Printing and distributing copies of technical reports to Chapter members, as well as to interested individuals and concerned organisations.
 Preparing meeting reports and Chapter news for publication in ACI's Concrete International magazine.

Chairperson	Mr. Aziz Mamuji
Member	Dr. Jafarali Parol
Member	Mr. Yousef A. Benawadh

■ Social Committee

Organizing major annual Chapter events and programs for Chapter members.
 Organizing field trips to major construction projects and industries.
 Arranging participation of the Chapter in selected national events

Chairperson	Ms. Dana Drobiova
Member	Mr. Mansoor Rao
Member	Ms. Satya Hany Awad
Member	Ms. Sana Javed

■ Training Committee

To serve the objectives of the Chapter by organizing training courses and technical workshops

Chairperson	Dr. Khaldoum Rahal
Member	Dr. Jafarali Parol
Member	Dr. Moetaz El-Hawary

■ Nomination Committee

Nominating individuals who have the interest, leadership qualities and willingness to serve the Chapter, for selection to the Board of Directors. The Committee submits names before the Chapter's Annual General Assembly, for election by members.

Chairperson	Mr. Bader Al-Salman
Member	Mr. Sami-ur-Rehman
Member	Mr. Saifuddin Patanwala
Member	Mr. Waleed Barakat
Member	Ms. Ibtisam AlKazemi

■ Annual Awards 2012 - 2013

The Kuwait Chapter of American Concrete Institute held its Annual Awards Banquet on 21st May, 2013. The event was organised under the patronage of His Excellency Eng. Abdul Aziz Al-Ibrahim, Minister of Electricity and Water and State Minister for Municipal Affairs. The function was held at Regency Kuwait Hotel, and was attended by a large number of colleagues representing many disciplines of the building industry, along with ACI members.

The Awards Ceremony is a highly anticipated annual event, during which ACI-KC recognizes outstanding projects and individuals. In addition to the regular awards for Excellence and Achievement, and the Certificate of Appreciation, two new categories were added this year. These included an award for an individual worthy of Special Recognition, and an Outstanding Residential Villa.

■ Award of Excellence

The Award of Excellence is presented annually to a local project of outstanding merit. This year ACI-KC honoured the Crystal Tower Project for its innovative use of concrete, and as a unique landmark in Kuwait. The award was given to Al-Arabiya Real Estate Company, the Owner and Developer of the project.



His Excellency Eng. Abdul Aziz Al-Ibrahim



Award Recipients and Board of Directors



ACI-KC Past President, Eng. Bader Al Salman.

■ Award of Achievement

The Award of Achievement is presented to an individual to recognize outstanding contribution to the Engineering Community and in the State of Kuwait. The award this year was given to Mr. Ubed Arain in recognition of his unique contribution, over many years, towards the advancement of Structural Engineering in Kuwait.

■ Certificates of Appreciation

The Certificate of Appreciation is presented to a Board Member who has completed 10 or more years of distinguished service for ACI-Kuwait Chapter. Two members were honored this year:

Dr. Moetaz M. El-Hawary
Associate Professor of Civil/ Structural Engineering,
Kuwait University.

Prof. Mohammad Naseer Haque
Professor of Structural Engineering and Concrete
Technology, Kuwait University.



Dr. Moetaz El Hawari receiving Certificate of Appreciation.



Dr. Khaldoun Rahal receiving Certificate of Appreciation on behalf of Prof. Mohamed Haque.



Eng. Ahmed Al Juheim
receiving Outstanding Residential Villa Award

■ Special Recognition Award

The Special Recognition Award recognizes an individual's outstanding contribution to the concrete construction industry in Kuwait. The award was presented to Mr. Mohammed Jassim Al Marzouq, Chairman of Tamdeen Group, for his entrepreneurship, leadership, and vision in the field of development.

■ Outstanding Residential Villa Award

The Outstanding Residential Villa Award is presented to a residential project in Kuwait, for its commendable architectural design and execution using concrete construction technology. The award was given to Al-Jazera Consultants for Mr. Khalid Al-Sahyaa Villa in recognition of its outstanding contemporary interpretation of traditional residential space.



Audience at the Award Ceremony Function

■ Award of Excellence

Innovative Use of Concrete

ACI - Kuwait Chapter presents the Award of Excellence to a project in recognition of outstanding concrete construction practices within Kuwait.

The Award of Excellence for 2012 -2013 was presented to Al-Arabiya Real Estate Company for Crystal Tower Project, for its innovative use of high performance concrete in structural elements; for implementing a unique architectural landmark; and enhancing Kuwait's fast changing skyline.

Crystal Tower Project is indeed an iconic landmark, and one cannot pass by it without being impressed by its attractive form and overall aesthetic quality. Structural and concrete engineers will also be impressed by the structural system that has been adopted in creating an outstanding building that deserves this recognition.



Crystal Tower during construction

The Award was presented to the Owner and the following Co-recipients :

- **Owner:** Al-Arabiya Real Estate Company
- **General Contractor:** Bukhamseen International Group for Contracting
- **Tower Design:** Hellmuth, Obata and Kassabaum, Inc. (HOK)
- **Local Consultant:** Dar Osama Bukhamseen Design
- **Concrete Supplier:** Asian Concrete Industries Company

Building Information

Crystal Tower is located on Ahmad Al-Jaber Street, near Abdul-Razzak Square, on a site of 2840 sq.m.

The building is essentially a business tower, with its basement parking supplemented by an adjacent multi-storey car-park.

The Tower sits on a 2.8 m thick raft foundation, constructed on 60 piles of 1.0 m diameter and 25 m length, all located directly under the tower.

Business Tower:

- Gross Area: 42,000 sq.m.
- Height: 220 m/53 storeys
- Main Feature: Central Atrium
- Retail: Ground, Mezzanine and Basement 1
- Parking: Basements 2 and 3
- Offices: 44 floors
- Services: 3 Mechanical floors/1 Evacuation floor.



Dr. Haider Al-Jumah receiving Award of Excellence

■ Award of Achievement

Contribution towards Advancement of Structural Engineering

This year the award was presented to Mr. Ubed Arain, Chief Executive Officer and Managing Director of Dar Gulf Consult. While Mr. Arain manages one of the oldest and largest consulting offices in Kuwait, his passion and pride remain being a Structural Engineer. Since he came to Kuwait and joined Gulf Consult 37 years ago, he has devoted his professional career to improving the status and standard of structural engineering in the country.

Mr. Ubed Arain was born in Nawabshah, Pakistan in 1947, and moved to Karachi in 1948. He graduated in 1969 with a Bachelor of Civil Engineering degree from NED Engineering College (University). He then traveled to USA for post-graduate studies, earning an M.Sc in Civil Engineering in 1971, from the University of California at Berkeley. He practiced in USA thereafter; and in 1973 passed the professional practice exam to become a Professional Engineer (PE) in the State of California. He was one of the founder members of ACI-Kuwait Chapter.



Eng. Ubed Arain receiving the Award of Achievement

■ Professional Career

In 1971 he joined Robert E. Jones Inc., Structural Engineers, based in St. Jose, California. While with them, he designed large nuclear blast resistant buildings (the Cold War was at its peak at that time); and several reinforced concrete and steel structures, including retrofits to satisfy seismic code requirements. In 1975, Mr. Hamad Alghanim (Abu Talal) convinced him to take up a one-year contract with Gulf Engineering Office (now Dar Gulf Consult). The 'one-year' has extended to 37 and still continues. Hand-in-hand with the late Abu Talal, Mr. Arain helped Gulf Consult grow from an office with a staff of 10 to become one of Kuwait's leading consulting offices, currently with more than 750 employees.

As would be expected, during his lengthy professional practice in Kuwait, Mr. Arain has been involved in and overseen the structural design of many major private and public buildings, as well as significant and innovative infrastructure projects. Some of the prominent developments in which he had a substantial direct involvement include: Sheikh Saad Abdullah Police Academy; The Scientific Center, (Recipient of 2001 ACI-KC Award of Excellence); Al-Kout, Fahaheel Waterfront (Recipient of 2004 ACI-KC Award of Excellence); Dasman Center for Research and Treatment of Diabetes; Kuwait National Petroleum Company Headquarters, Abdul-Aziz Al-Babtain Cultural Waqf Project, Jaber Al-Ahmad Hospital, South Surra; Ministry of Education Headquarters; Major Colleges at the New Sabah Al-Salem University City; and Passenger Terminal 2, Kuwait International Airport.



■ Special Recognition Award

Entrepreneurship, Leadership, and Vision in The Field of Development

The Special Recognition Award is presented to an individual who has made a significant contribution towards the development of Kuwait, and who has supported the concrete construction industry in the country. The award also recognizes: Entrepreneurship for undertaking innovative investments and for demonstrating impressive finance and business acumen; leadership qualities and intelligence in guiding growth; and vision, which throughout the individual's career is demonstrated through positive foresight.

The Special Recognition Award was presented to Mr. Mohammed Jassim Al Marzouq for his commendable entrepreneurship, leadership and vision, and his positive impact on developments in Kuwait.

Mr. Mohamed Al Marzouq graduated from Kuwait University in 1991, with a Bachelor's Degree in Commerce. Since 1996, he has served as the Chairman and CEO of Tamdeen Real Estate Company, a position in which he is still continuing. Under his leadership, the Company and the assets of Tamdeen Group have continued to grow and are today valued at US \$ 3.6 billion. He also serves on the Board of a number of other prestigious companies which include Ahli United Bank, Bahrain; Fateh Al Kheir Holding

Company; Al-Maalem Holding Company, Bahrain; as well as Tamdeen Bahraini Real Estate Company of which he is the Chairman.

In spite of his many responsibilities, Mr. Al-Marzouq is very much a family man and is a devoted father to his two children. He also prides himself of being a humble person. His personal qualities have earned him the respect of the employees of the Group, even more than his achievements.

Mr. Al-Marzouq is also well-known for his passion for breeding horses; and he has one of the finest collections of Arabian horses.



Mr. Mohamed Al Marzouk receiving the Special Recognition Award

■ Outstanding Residential Villa Award

Outstanding Contemporary Interpretation of Traditional Residential Space

ACI-Kuwait Chapter's Outstanding Residential Villa Award recognizes a residential building of an meritable architectural quality as well as good use of concrete construction technology.

The 2012- 2013 Outstanding Residential Villa Award was presented to Al-Jazera Consultants for Mr. Khalid Al-Shayaa Villa. The project was particularly appreciated for its outstanding contemporary interpretation of traditional residential space. The building is located in Bnaider, an area which with its sandy beaches is a very popular weekend retreat suburb of Kuwait. The residential development comprises three chalets. The main chalet overlooks the Arabian Gulf, and is flanked on either side by the other two villas. A separate annex building accommodates the services which are shared by the three chalets. Each chalet is planned to overlook an interior atrium; and the reception of the main chalet overlooks the Arabian Gulf. The villas share a central courtyard, which includes a swimming pool and shaded gathering area. The complex also contains two large separate Diwaniyas for men and women.



■ Technical Activities

ACI-KC regularly conducts technical seminars to introduce members and interested professionals to modern trends in engineering design and practice.

■ Magnetized Water Concrete and Sustainability

In March 2013, Dr. Moetaz El-Hawary conducted a seminar on "Magnetized Water Concrete and Sustainability". The well-attended seminar was held at Kuwait Society of Engineers, and discussions focused on the general use of magnetic fields in many industries, with emphasis on the use of magnetized water in concrete production.

The effect of magnetic water on concrete sustainability and on the production of low carbon concrete were also addressed. The benefits of magnetized water in the fields of health, agriculture, environment, energy and construction, were highlighted. It was concluded that the use of magnetized water will increase concrete sustainability through cement reduction; increase in durability (due to its effect on workability, interface and permeability); economy; and the possibility of using non tap water.

■ Synthetic Macro Fiber Technology

A technical seminar on the subject of "Use of Synthetic Macro Fiber Technology" was conducted by Mr. Gerard Attree on 20th November, 2013 at the Kuwait Society of Engineers. Mr. Attree is the Engineering Services Group Manager, EMEA Region, of GRACE Construction Products Company. He has over 25 years of experience in the field of construction and ready-mixed concrete. He is a member in ACI; the Institute of Concrete Technology; UK Concrete Society; and ACIFC.

Mr. Attree's presentation and seminar focused on the properties and advantages of utilizing macro fibers in concrete members. Fibers may be used as the main reinforcement for thin structures, and they have a very positive effect on impact resistance, ductility, toughness and crack arrest of concrete members.

The seminar was sponsored by GRACE Construction Products Company and was attended by many ACI-KC members.



Dr. Moetaz El Hawari

■ The Big 5 Kuwait

ACI-Kuwait Chapter was involved as a co-sponsor in The Big 5 Kuwait event held in September 2013. The Big 5 is acknowledged as the largest exhibition related to the construction and building industry in the Arabian Gulf region. Over the past many years it has been held in Dubai, but this year the organisers decided to expand to other Gulf countries, including Kuwait. ACI-KC, as one of the leading technical organizations in Kuwait, was invited to be a co-sponsor and a Memorandum of Understanding was signed. This helped establish a link between ACI-KC and the Big 5 sites.

The Big 5 Kuwait event was accompanied by a scientific conference entitled "Sustainable Design and Construction". Dr. Moetaz El-Hawary, Chairperson of the ACI-KC Technical Committee participated in the conference, and presented a paper entitled "ACI Recommendations for Green Concrete and Building Materials". We are already looking forward to the 2014 event which is scheduled for 1618- September 2014. It will be held at Kuwait International Fairground and ACI-KC will again be involved as a sponsor.



■ 2nd Symposium of Concrete in Kuwait

A symposium entitled “2nd Symposium of Concrete in Kuwait” was held over the period 18 -21 March, 2013 at the Australian College of Kuwait campus. The event was organized by a group of prominent construction related companies, with ACI-Kuwait Chapter as one of the official sponsors. The symposium was convened under the patronage of His Excellency, Eng. Abdulaziz Al Ebraheem, Minister of Electricity and Water and Minister of Public Works.

The main objective of the symposium was to “enhance the understanding of concrete amongst participants in the concrete industry, to enable them to produce high quality buildings and facilities that are durable for a long period”. The symposium was supplemented with technical workshops.

Members of ACI-KC’s Board of Directors participated, and speeches and presentations were made by the President, Eng. Bader Al Salman, as well as Dr. Khaldoun Rahal, Dr. Hassan Kamal and Dr. Moetaz El-Hawary.



ACI-KC Past President, Eng. Bader Al Salman addressing the Symposium



Symposium Delegates

■ Social Activities

■ Jahra Road Development Project Site Visit

On Saturday, 9th February, 2013, ACI-KC Social Committee organized a visit for its members' to the Jahra Road project which is currently under construction. Eng. Hazem Helmy, Quality Manager, of Arab Contractors, explained the background to the project, its design and the current status of on-site work. This was followed by visiting the precast yard, and some ongoing construction activities.

Reinforced concrete slabs, beams and other items used in the Jahra Highway Project are manufactured in a separate 150,000 sq.m. yard with special technology which is being used for the first time in the Middle East Region. The precast facility, the first ever precast yard for producing bridge segments in Kuwait, is a fully computerized and automated. The facility also houses the steel and segment mould factory.



ACI Members at the Jahra Road Development Project construction site



The Jahra Road Development Project is located in the western region of Kuwait, which extends from the Jahra Gate (Jahra Gate Roundabout-Sheraton), to the United Nations Roundabout. The project valued at KD 264.7 million (\$912.6 million approx) was started in September 2010 and is projected to finish January 2016.

It is also one of the main projects in the Ministry of Public Works' strategic plan to develop roads and motorways in the State of Kuwait, in order to address future traffic demand, minimize congestion and improve road safety.

ACI-KC would like to thank Jahra Road Project team for their time and efforts for making this visit a successful, informative and enjoyable.



■ Family Fun Day

The ACI-KC Social Committee organized a “Fun Day” family camp on Friday, 8th March, 2013. The family fun day, which was blessed with beautiful weather, was held at Kuwait Society of Engineers’ Green Camp. It started at 10.00 am and continued up to 5.00 pm.

The outing, well attended by members, their families and friends, started with breakfast. Throughout the day, children and adults entertained themselves with activities like face painting, henna, ball throwing, balloon darts and other games. Lunch was served after Friday Prayers, and this was followed by the main stage activities in which the young and old participated with great enthusiasm. Valuable prizes were won by many.

The day ended with a Raffle Draw which brought a wave of excitement for all. The lucky ones won exclusive prizes; but everyone went home with great memories to share with family and friends.

ACI-KC would like to take this opportunity to thank Kuwait Society of Engineers for allowing the use of their Green Camp. We also thank Commit General Trading and Contracting Company, who as the event managers, made good arrangements.



Children and adults enjoying themselves!

■ Technical Article

Infrared Thermography: Applications in Civil Engineering

Dr Jafarali Parol, Jamal Al-Qazweeni and Dr Hasan Kamal
Kuwait Institute for Scientific Research

■ Introduction

Infrared thermography (IRT) is a useful tool to investigate structural health condition and damage assessment of buildings, bridges etc [1- 4]. This is a contact free and non-destructive qualitative test (NDT). The contact-free aspect of this method is very attractive, when rapid measurements are desired.

IRT was discovered by Williams Herschel around 1800. During an experiment to find optical filter material Williams observed that any object at a temperature above absolute zero emits infrared energy in the form of rays which fall into the infrared region (that is invisible to the human eye) of the electromagnetic spectrum. Infrared thermography can be used along with several other methods of NDT, and was found to be fast and effective in scanning large areas and locating zones of deficient concrete in the structures. The regions of concrete of suspect quality can then be checked by other NDT methods for confirmation, and to design suitable remedial methods. Efficient infrared cameras and image processing software are now available to carry out IRT investigations. The application of infrared thermography in civil engineering is an established NDT method for economical, accurate and convenient investigation of the quality of insulation of buildings, heat loss through windows, investigation of water proofing quality for walls and roof etc.

Thermal imaging is a technique for converting the thermal radiation patterns emitted by the object into a visual image. An infrared camera can be used to get the image of the emitted infrared radiation from the object. This image is dependent on the surface temperature of the object. This is the basic working principle of IRT.

■ Application in Civil Engineering

IRT has numerous applications in condition assessment of structures, quality control applications during construction as well as investigations of completed structures without interrupting the construction or usage of the structure.

Thermography is used, as a global and fast technique to scan the area under examination, and identify the location of the defect on the temperature field. Thermal images can be used to determine the state of fresh and hardened concrete. Most of the components of a structure including retaining walls, piers, abutments, and superstructure can be scanned using an IRT camera. The heat rate is influenced by the presence of defects (voids) inside the mass concrete. This influence may be projected to the surface by variations of the temperature distribution. The variation is more as the defects are closer to the surface. Photograph and thermal image of a segment of a flyover are depicted in Figure 1(a and b). This thermal image shows a clear surface with no blemish or variation and this shows a uniform quality of concrete [4]. Figure 2 shows another thermal image of a bridge deck slab. The bright patches in Figure 2 indicate the variation in concrete quality. In practice, all such suspected regions are selected and subjected to further investigation to confirm defective concrete.



Figure 1a: Photograph of the soffit of a flyover

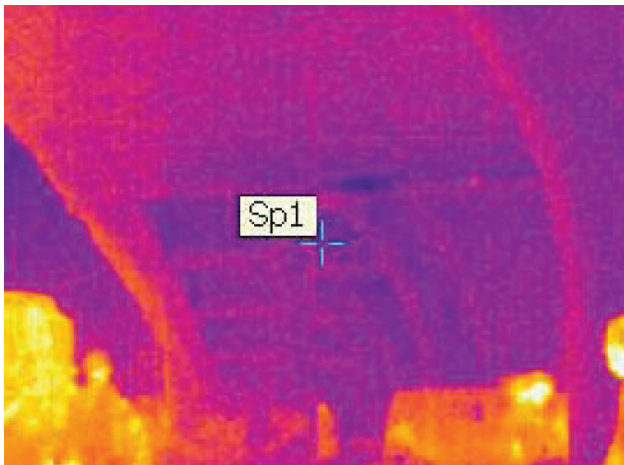


Figure 1b: Thermal image of Soffit of a flyover

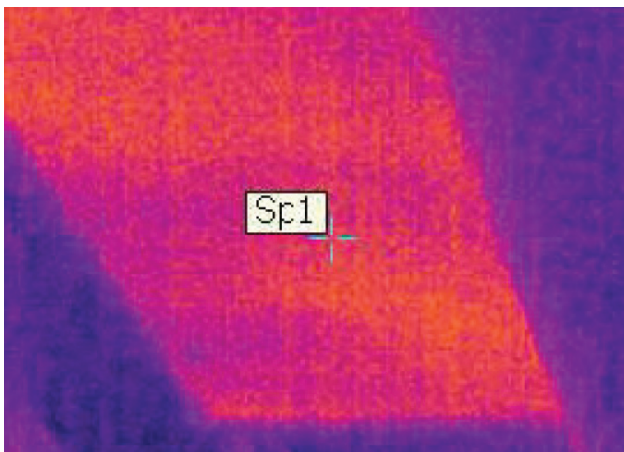


Figure 2: Thermal image of deck panel

Subsurface voids will affect the rate of heat flow through a structure, thereby resulting in surface temperature differentials. Therefore by measuring the surface temperatures the subsurface defects can be located. Using this principle, IRT can be applied to investigate delamination in FRP layers in bridge decks, delamination between FRP wrap and the underlying structural component in repaired structures etc. Figure 3 shows an experimental set up that was carried out to investigate delamination of FRP bridge deck slab using IRT. In this study three different size debond (air filled and water filled) was created and a thermal image of the same captured the debond very efficiently.

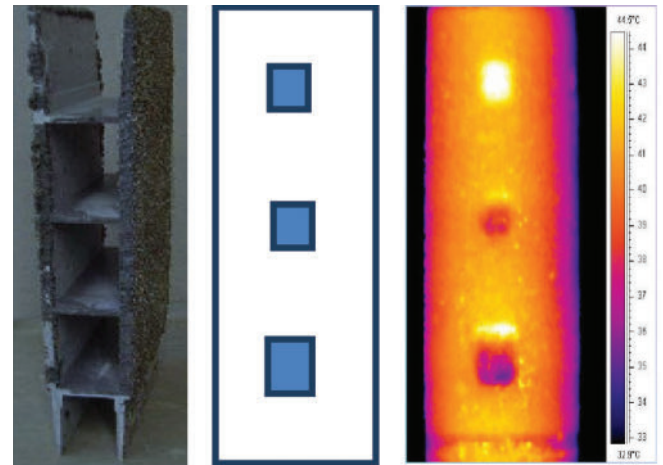


Figure 3: Experimental set up and thermal image of a FRP deck slab with two air-filled and water-filled debond.

IRT has been successfully applied for characterization of subsurface flaws in concrete members initiated by metal rebar corrosion, identify moist area in concrete (for water leakage issues), to investigate flow through pipes and plumbing etc. It may be noted that subsurface flaws such as due to rebar corrosion will give no visual sign until cracks break the surface.

Though there are many limitations to use IRT, applicability of IRT in civil engineering has not been fully explored yet. IRT has an immense potential in quality control during construction and investigations on deteriorated structures without interrupting construction or utility of the structure.

References

1. J. Al-Qazweeni, H. Kamal. "Infrared Imaging of Roof Systems for Moisture Detection", Conference on Non-destructive Testing of Materials and Systems (2011), Istanbul.
2. DG. Aggelis, EZ. Kordatos, DV. Soulioti, TE. Matikas, "Combined use of thermography and ultrasound for the characterization of subsurface cracks in concrete", Construction and Building Materials 24 (2010) 1888–1897.
3. X Maldague. Theory and practice of infrared technology for nondestructive testing. New York: John-Wiley and Sons; 2001.
4. DSP Rao, Assessment of Concrete Bridge Structures Using Infrared Thermography, Technical Series, Application Note for Research and Science.

■ ACI - KC News

Dr. Hasan Ali Kamal

Elected as Member of Municipal Council

In September 2013, Dr. Hasan Kamal, a Past President of ACI-KC, was elected as a Member of the Municipal Council of Kuwait. ACI-KC Board Members congratulated and presented a memento as a gesture of appreciation to him for his long association with us. They expressed confidence that Dr. Hasan Kamal in his new role will make a great contribution to the development of Kuwait and producing municipal legislation to facilitate the anticipated boom in infrastructure developments in the country, as it continues to move forward.

Dr. Hasan Kamal received his B.S. and M.S. degrees in Civil Engineering from Kuwait University in 1990 and 1996, and completed his Ph.D. degree at the University of Maryland at College Park, USA, in 2001.

He was a Research Scientist and Program Manager at the Kuwait Institute for Scientific Research (KISR); and has several scientific publications in international journals and conferences, and technical reports. He is a reviewer for several international journals, and serves as technical committee member for international conferences.



Dr. Hasan Kamal with ACI-KC Board Members

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ACI - KC appreciates the support of various Companies and Consultants in Kuwait



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تسويقة الطنيب التجارية



شركة اسمنت الكويت للخرسانة الجاهزة
KUWAIT CEMENT READY MIX COMPANY
رأس مال مسجل - دينار كويتي مدفوع بالكامل



دار فيس للإستشارات الهندسية
معماريون، مهندسون، ومحللون
DAR FACE Consultant Engineers
Architects, Engineers & Planners



GEC DAR
GULF ENGINEER'S CONSULTANTS

ACICO CONSTRUCTION
BUILDING ON SOLID FOUNDATIONS



AAC
Abdulaziz Alsaqabi
Consulting Engineers

LAFARGE
READYMIX
KUWAIT

Membership Application

Photo

First Name

الاسم الاول

Middle Name

الاسم الثاني

Surname

اللقب

Employer/Organization: Corporate Title:

Address:

Telephone No.: Mobile/Pager No.: Fax No.: E-mail:

Categories of Membership

Please check the category of membership you are applying for and provide the appropriate dues as described below:

☐ Organizational: KD 100/Year... (A Firm, corporation, agency of government, society, etc.).

☐ Individual: KD 15/Year...(A person who is a member of ACI International).

☐ Affiliate: Please check the category of membership you are applying for.

☐ Student: KD 5/Year... (Full time student at an Educational Institution)

Member Profile Information (Please check only one box in each section)

- | | | |
|---|---|---|
| ☐ Officer, Top Management | ☐ Engineering Services | ☐ Testing Laboratory |
| ☐ Administrative, Operating Management | ☐ Constructing Services | ☐ Quality Control |
| ☐ Plant, Production and Construction | ☐ Architectural Services | ☐ Research Services |
| ☐ Design engineering Management | ☐ Management | ☐ Concrete Products |
| ☐ Architectural Engineering Services | ☐ Design Engineer | ☐ Educators |
| ☐ Chemicals and Allied Products | ☐ Material Engineer | ☐ Student |
| ☐ Contructons Machinery and Equipment | ☐ Plant Engineer | ☐ Utility |
| ☐ Concrete Block and Brick | ☐ Research Engineer | ☐ Architect |
| ☐ Ready Mixed Concrete | ☐ Sale and Marketing | ☐ Government |
| ☐ Educational Institutions | ☐ Technical Specialist | ☐ Other (Please especfy) |

Are you intrested in joining an ACI Chapter Committee?

() YES

() NO

Method of Payment

☐ Cash ☐ Cheque (Payable to ACI-Kuwait Chapter)

Receipt

Cheque No.

☐ Money Transfer (payable to ACI-Kuwait Chapter, Account No. 06655310 with The Gulf Bank)

Transaction No.

For ACI Kuwait Chapter use only:

Membership No.

Date:



Detailed Information Please Contact:

ACI Kuwait Chapter-P.O. Box 12608, Shamiah 71657

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