Concrete Conference on Sustainability & Durability | Virtual
16-17 November 2020

PROGRAM BOOK

UAE CHAPTER

American Concrete Institute
Eastern Province Chapter

CORTEC MIDDLE EAST
Environmentally Safe VpCI®/MCI® Technologies

MASTER® BUILDERS SOLUTIONS

DAY 1

TIME	AGENDA	SPEAKER
4:00 PM	Welcome & Agenda Overview	Muhammad K. Rahman, PhD
	ACI President Welcome Note	Jeffrey W. Coleman, PE, FACI
4:05 PM	American Concrete Institute: More Than Just ACI 318	Stephen Szoke, PE, FACI, FASCE, FSEI, LEED/AP
4:20 PM	SCM for Durable & Sustainable Concrete, UAE Case Studies	Fouad Yazbeck, MACI
4:45 PM	Concrete: Adaptive and Resilient Engineering for Climate Change	Julie K. Buffenbarger, FACI, LEED AP BD+C
5:15 PM	Building a Sustainable Future, Green Sense Concrete	Daniel Touma - Master Builder Solutions, A brand of MBCC Group
5:40 PM	10-Minute Break	
5:50 PM	Durability Design Using Service Life Prediction	Kyle Stanish, PhD, SE, PE
6:15 PM	Sustainability and the ACI Building Code: Plans for the 2025 Edition of ACI 318	Andrew W. Taylor, PhD, SE
6:40 PM	Q & A Panel Session	Moderator: Muhammad K. Rahman, PhD
6:55 PM	Day 1 Closing Remarks	Muhammad K. Rahman, PhD

DAY 2

TIME	AGENDA	SPEAKER
4:00 PM	Welcome & Agenda Overview	Ahmad Mhanna
4:05 PM	FRP Composite Bars for Sustainable Concrete Structures in the Arabian Gulf Region	Mesfer Al-Zahrani, PhD Muhammad K. Rahman, PhD
4:30 PM	The Impact of Using FRP on Concrete Durability & Sustainability: Application in Florida and Caribbean	Antonio Nanni, PhD, PE
5:15 PM	Migrating Corrosion Inhibitors for Durable RC Structures	Shadi Hindaileh, PE – Cortec Middle East
5:40 PM	10-Minute Break	
5:50 PM	Improved Sustainability through Durability Design	R. Douglas Hooton, PhD, PE, Hon M ACI
6:15 PM	Sustainability & Durability in the Egyptian Building Code	Tamer Elafandy, PhD
6:40 PM	Q & A Panel Session	Moderator: Ahmad Mhanna
6:55 PM	Day 2 Closing Remarks	Ahmad Mhanna

CONFERENCE SPEAKERS

Ahmad Mhanna, Moderator

Ahmad Mhanna is the ACI Middle East Regional Director. Mhanna received his bachelor's degree in civil engineering from the University of Jordan, Amman, Jordan, and his MS in emerging technologies for construction from University of Naples Federico II, Naples, Italy. He also obtained an Infrastructure Renewal Engineering Certificate from Missouri University of Science and Technology, Rolla, Missouri. Mhanna holds multiple ACI certifications and has served as an ACI Certification Examiner. Mhanna has wide-ranging experience in concrete and construction materials testing, analysis, and applications. He has been involved in product development, construction chemicals production quality control, cement and concrete research projects, inspection, and technical support while serving in different positions for 15 years. Prior to joining ACI, Mhanna was the Technical Marketing Chief at Qatrana Cement Company of Jordan. Previously, he has served as member of ACI Subcommittee 364-L, Liaison Subcommittee (Rehabilitation), and has been a Board member of the Jordan Concrete Association since 2012.

Julie K. Buffenbarger, FACI, LEED AP BD+C

Julie K. Buffenbarger is a Senior Scientist & Sustainability Principal for Beton Consulting Engineers, Mendota Heights, Minnesota. She also serves part-time as a QA/QC Manager for Tech Ready Mix in Cleveland, Ohio.

Her proficient knowledge of multiple building and infrastructure sustainable and resilient rating systems has been instrumental in advocating concrete products in the buildings, roads, and energy construction segments. She has collaborated with numerous U.S. and international sustainability groups. Buffenbarger has authored and co-authored over 70 publications on cementitious materials, concrete sustainability, durability and resilience, and concrete admixtures. She was also Co-Editor of ACI SP-269, *Concrete: The Sustainable Material Choice*, in 2010.

Buffenbarger received her BS in chemistry and MS in synthetic organic chemistry from Bowling Green State University. She is also an accredited LEED™ A.P. Building Design and Construction professional. In 2011, she was made a Fellow of the American Concrete Institute.

Mesfer M. Al-Zahrani, PhD

Dr. Mesfer Al-Zahrani is the Vice Rector for Academic Affairs and Associate Professor in the Department of Civil and Environmental Engineering at King Fahd University of Petroleum & Minerals (KFUPM). He obtained his bachelor's and master's degrees in civil engineering from KFUPM and his PhD in civil engineering from Pennsylvania State University in 1995. He worked previously as the Dean of Student Affairs and the Dean of the College of Engineering. Dr. Al-Zahrani's research interests include the performance and durability of infrastructure facilities, the impact of the environmental conditions on the durability, and performance of various construction materials such as concrete, reinforcing materials, protective coatings and advanced composite materials. Dr. Al-Zahrani has published many research papers in scientific journals and participated in international conferences. He has chaired and participated in several research projects funded by KACST, Saudi Aramco, Royal Commission for Jubail and Yanbu, SABIC, and other companies.

Tamer Elafandy, PhD

Tamer Elafandy is a Professor of concrete structure at the Concrete Institute, Housing and Building National Research Center in Giza, Egypt. Elafandy has more than 20 years of experience in design and strengthening of prestressed and non-prestressed concrete structures, which is his main area of research. Elafandy is a member of many committees and organizations including coordinator of the Egyptian Code of Practice for the Use of Fiber Reinforced Polymer, ECP208-2005 AND 2019, the Egyptian Code for Design and Construction of Concrete Structures, and more.

Shadi Hindaileh, PE

Shadi Hindaileh received his BSc in civil engineering from Birzeit University, Palestine, in 2002. Hindaileh, throughout his 18 years in material and structural design fields, has gained a thorough knowledge in reinforced concrete structures. He has spent the last 8 years in reinforcing bar corrosion solutions with an eye on the durability of reinforced concrete structures for many mega projects across the GCC. Hindaileh has held several technical and managerial positions at renowned multinational companies in the construction sector. At present, he is the durability specialist and the regional specification manager at Cortec Middle East.

R. Douglas Hooton, PhD, PE, Hon MACI

Dr. R. Douglas Hooton is a Professor and NSERC/Cement Association of Canada, Senior Industrial Research Chair in Concrete Durability and Sustainability in the Department of Civil and Mineral Engineering at the University of Toronto, where he has taught and conducted research for more than 33 years. In addition to his ACI activities, he also chairs ASTM Committee C01 on Cements and CSA Committee A23.1/A23.2 on Concrete Materials and Methods of Construction.

Antonio Nanni, PhD, FACI, PE

Antonio Nanni is the Inaugural Senior Scholar, Professor, and Chair in the Department of Civil, Architectural, and Environmental Engineering. His research interests are in construction materials, their structural performance and their field application. He is a site-director of the NSF I/U CRC Center for the Integration of Composites into Infrastructure. His research in materials and structures has impacted the work of technical committees in the US and abroad including professional and standards-writing agencies such as AASHTO, ACI, ASCE, ASTM International, and ICC-ES. He has published extensively in refereed journals, conference proceedings, and co-authored two books. He is a licensed PE in Italy as well as the states of Florida, Pennsylvania, Missouri, and Oklahoma. Nanni is a Fellow of the American Concrete Institute.

Muhammad Kalimur Rahman, PhD, Moderator

Dr. Muhammad Kalimur Rahman is Senior Researcher and Associate Professor in the Center for Engineering Research at Research Institute of KFUPM. He obtained MS degree from the University of California at Berkley, USA, and his PhD from KFUPM. His research interests include non-metallic reinforcement in concrete, nanomaterials in cement, concrete materials using waste, oil well cementing, repair of concrete structures, structural strengthening using carbon fiber, buried pipelines for hydrocarbon, finite element analysis and chloride diffusion in concrete. Dr. Rahman has conducted more than 45 client-funded research projects as Project Manager/Principal Investigator (PI) in the last 5 years, worth more than 25 million Saudi Riyal. Dr. Rahman is actively involved in teaching graduate and undergraduate courses and research activities in the Petroleum and Civil Engineering Department and was Co-advisor in 14 PhD/MS theses in the past few years. Dr. Rahman has seven patents and more than 150 papers in refereed journals. He is currently Vice-President of the ACI Saudi Chapter in the Eastern Province.

Kyle Stanish, PhD, SE, PE

Kyle Stanish is currently the Vice President of Engineering for the Tourney Consulting Group. He provides durability design and service life evaluation of both new and existing structures, including bridges, marine structures, parking garages, rail structures, and tunnels.

Stephen Szoke, PE, FACI, FASCE, FSEI, LEED AP

Stephen Szoke, a Code Advocacy Engineer with the American Concrete Institute, has his civil engineering degree from Lehigh University. He is a licensed professional engineer; Distinguished Staff Member and Fellow of ACI, American Society of Civil Engineers, and Structural Engineering Institute and is a Leadership in Energy and Environmental Design Accredited Professional.

Szoke has an extensive history in the advancement of technology and development codes and standards related to concrete and masonry. He achieved leadership roles within several codes and standards development organizations, including a governor on the SEI Board. He continues active participation with SEI, National Institute of Building Sciences, International Code Council, and other codes and standards development organizations.

Andrew W. Taylor, PhD, SE

Andrew W. Taylor, PhD, SE, FACI, is Technical Director with KPFF Consulting Engineers in Seattle, Washington, USA. He is KPFF's lead for design of special seismic systems such as seismic isolation and seismic damping. He is also a specialist in seismic design of reinforced concrete structures. His professional experience spans 30 years of structural engineering research and practice, including 7 years with the Building and Fire Research Laboratory at the National Institute of Standards and Technology. Dr. Taylor is a current and past member of numerous technical committees at the local and national levels. He is currently Chair of ACI Committee 318, Structural Concrete Building Code, which will complete the next edition in 2025. Other committee memberships include the seismic provisions committee for the 2022 edition of the ASCE 7 building code; past project team member for Applied Technology Council project ATC-98 on the use of high-strength reinforcement for seismic design; and past Chair of the Earthquake Engineering Committee of the Structural Engineers Association of Washington State. Dr. Taylor serves as an Affiliate Professor in the Department of Civil and Environmental Engineering at the University of Washington, where he has taught courses in structural analysis and reinforced concrete design.

Daniel Touma

Daniel Touma's experience in construction industry spans over two decades. He holds a Master's degree in Science in Advanced Concrete Technology from Queens University, Belfast, Ireland. His thesis studied the Use of Waste and Recycled Materials in Self-Compacting Concrete in the Gulf Region. His experience with Master Builders Solutions started in 2007. After the position of Admixtures System Country Manager in BASF Qatar, he currently occupies the position of Green Sense Concrete Manager for a region covering Middle East, West Asia, CIS, and Africa. This role allows him to develop and implement a successful sustainability strategy via Green Sense Concrete Technology.

A vehement believer in Green Sense Concrete, Touma covers areas of expertise including Sustainable Development Strategies, Life-cycle analysis, Environmental Product Declarations, LEED projects, Green Communities and High-Performance Buildings.

Fouad Yazbeck, MACI

Fouad Yazbeck is currently involved in some of the largest infrastructure and construction projects in the region. He started his career as area sales manager for BASF Construction Chemicals in Lebanon, where he established the company's presence. He then moved to Abu Dhabi, where he was responsible for the concrete admixtures market.

Yazbeck has over 20 years of experience in the concrete industry and is member of the Beirut Order of Engineers, member of ACI, Founding member of ACI Lebanon Chapter, and ACI UAE Chapter. Yazbeck is Chair of ACI Committee 234, Silica Fume in Concrete, and a member of ACI Committee 318, Structural Concrete Building Code.

SESSION DESCRIPTIONS

DAY 1

American Concrete Institute: More than Just ACI 318;

presented by Stephen Szoke, PE, FACI, FASCE, FSEI, LEED AP

Learn about the variety of products and services developed and provided by the American Concrete Institute. This is an overview of ACI which includes a description of the organization and how it works with a focus on the many benefits provided through membership and a variety of opportunities for member engagement.

Supplemental Cementitious Materials for Durable and Sustainable Concrete;

presented by Fouad Yazbeck, MACI

Concrete: Adaptive and Resilient Engineering for Climate Change;

presented by Julie K. Buffenbarger, FACI, LEED AP BD+C

Concrete, a core building material, has general properties—including strength, durability, versatility, and relatively low cost—making it the most used building material globally. The demand for concrete is driven by a combination of global macro-scale trends including population growth, urbanization and industrial production that have driven increased consumption of resources (energy, water, materials, and land), political conflict, and climate change. These are all immediate and imminent challenges in the coming decades and provide an impetus for an increasing need for the resilience of buildings and infrastructure manufactured with concrete.

Standing threats due to climate change include increased frequency of earthquakes, hurricanes, tornadoes, and wildfires; higher ambient temperatures; rising sea levels and changing rainfall patterns. These, in conjunction with intensified weather events ranging from floods, droughts, and wind events, significantly threaten the natural and built environments and substantially influence the world economy, the health of the planet, and society's health and quality of life.

Building and infrastructure design is based on safety provisions in building codes, engineering design standards, and industry expertise to meet its intended purpose and service life. Still, it fails to include fortification against extreme or progressive climate events. Sustainable, resilient design, and construction minimize the risk of failure for buildings and infrastructure through enhanced robustness, durability, longevity, disaster resistance, and structures safety. In conjunction with these principles, climate-adaption engineering provides hazard-resistant construction, retrofitting of existing buildings, and securing of building components. Adoption of these design and engineering measures are essential with regards to critical infrastructure such as transport (roads, bridges, airports, railway stations, and bus terminals); vital facilities (hospitals, schools, and governmental facilities); power grids, telecommunications, security and emergency services; water and sanitation, all critical assets. Sustainable, resilient design and climate-adaption engineering embrace the use of innovative materials and technology, sound construction practices, and employment of appropriate inspection and maintenance strategies.

Building a Sustainable Future, Green Sense Concrete

presented by Daniel Touma - Master Builder Solutions, A brand of MBCC Group

The sheer volume of construction activity has placed significant stress on the market; especially for the raw materials. This increase in construction activity has resulted in the depletion of natural resources of virgin materials and emitting huge quantities of greenhouse gases which, in turn, has had a huge impact on environmental sustainability. Since concrete dominates infrastructure and building construction, cement and aggregate supply is a big concern.

On the other hand, a vast amount of construction, demolition and excavation wastes, fillers, powders, etc. have been generated during the demolition of concrete structures and other processes. Disposal of these wastes also has a huge impact on the environment.

Because of all these factors, environmental sustainability and economy is becoming an increasingly important part of construction.

The Green Sense Concrete concept from Master Builders Solutions is an environmentally-friendly, cost-effective concrete with optimized proportions program in which supplementary cementitious materials, non-cementitious fillers and recycled materials are used with Master Builders Solution chemical admixtures to meet or exceed performance targets.

The positive impact of using Green Sense Concrete concept on sustainability criteria quantified the economic and ecological impact of Green Sense Concrete mixes by certified eco-efficiency analysis report combines a life cycle assessment with life cycle costs.

Durability Design Using Service Life Prediction;

presented by Kyle Stanish, PhD, SE, PE

Concrete has traditionally been thought of as an inherently durable material. Codes have generally focused on its structural performance, and the assumption was made that if the concrete was strong enough, it would be able to last long enough for its purpose. Eventually, some durability requirements were included, but these were generally prescriptive and do not account for all environments and exposures. There is a whole concrete repair industry that can attest to the inadequacy of these assumptions. Durability design is an emerging field that can provide improved performance for structures while not requiring unnecessary cost. The durability properties of the structure are customized to the environment to provide the necessary performance, just as its structural properties are. Service life models are one of the tools that durability engineers use. This presentation discusses the durability design approach as is currently being applied, and considers different service life models that are currently used in the industry.

Sustainability and the ACI Building Code: Plans for the 2025 Edition of ACI 318;

presented by Andrew W. Taylor, PhD, SE

With the growing worldwide emphasis on reducing embodied carbon within the built environment, structural building codes are beginning to include provisions that address the use of concrete formulations, structural design methods, and construction practices aimed at significantly reducing environmental impacts. This presentation provides an overview of the work currently under way to introduce principles of sustainable design into the ACI 318 Building Code, the next edition of which will be published in 2025. While the current version of the ACI 318 Building Code, ACI 318-19, generally allows for the consideration of sustainability in the development of concrete structures, it does not include specific guidance about how the relative sustainability of concrete mixtures and systems are to be measured and compared. Within the ACI 318 code committee, Subcommittee N is focused exclusively on writing a new appendix for the ACI 318-25 code that will address sustainability. This presentation summarizes the current work of Subcommittee N in implementing new practices for the sustainable design and construction of concrete structures.

DAY 2

Fiber-Reinforced Polymer Composite Bars for Sustainable Concrete Structures in the Arabian Gulf Region;

presented by Mesfer M. Al-Zahrani, PhD, and Muhammad K. Rahman, PhD

Impact of Using Fiber-Reinforced Polymer on Concrete Durability and Sustainability;

presented by Antonio Nanni, PhD, PE

More than any other regions of the planet, coastal areas are subject to unprecedented challenges deriving from extreme weather events, sea-level rise, depletion of natural resources and population growth. This presentation intends to show some examples of construction that demonstrate the use of fiber-reinforced polymer (FRP) composites as internal reinforcement for concrete structures addressing the need for extended durability and sustainability. The choice of FRP is because this reinforcement type is immune to chlorides and does not corrode. The case studies selected for this presentation cover different applications such as seawalls, bridges, marine dock, and buildings.

Improved Sustainability Through Durability Design;

presented by R. Douglas Hooton, PhD, PE, Hon MACI

While many new types of concrete binder materials have been proposed to produce lower-carbon footprint concrete, far bigger contributions to sustainability over the whole life-cycle of concrete structures and infrastructure can be made through better design requirements and construction practices to ensure that sufficient durability is attained to extend their useful service life. This requires more than selection of limits on such things as maximum *w*/*cm* and minimum strength to meet durability requirements as typically required in building codes. Factors influencing durability of as-constructed structures include the materials, the concrete mixture designs, volume stability, crack control (influenced by size, shape, and restraint of structural elements, as well as structural detailing), as well as placing, protection and curing methods during construction. Prequalification testing of concrete placed in mock-up units, evaluation of the adequacy of the contractor's construction processes, as well as on-site inspection are required to ensure that in-place durability is obtained. Globally, the most severe environment that has resulted in premature deterioration of concrete structures is from corrosion of reinforcement in chloride exposures, from both marine and de-icing salts. Obtaining durability for a known service life in chloride exposures requires knowledge of the concrete properties, relevant transport processes, depths of cover, as well as minimization of cracking and construction defects. These issues will be discussed in the presentation.

Sustainability and Durability in the Egyptian Building Code;

presented by Tamer Elafandy, PhD

Migrating Corrosion Inhibitors for Durable Reinforced Concrete Structures;

presented by Shadi Hindaileh, PE

Chloride-induced corrosion of reinforcing bars is a major cause of reinforced concrete degradation. It is considered the bottleneck for achieving durable concrete structures with longer service life.

Corrosion inhibitors have been widely used for this purpose. Their use is demonstrated by extensive lab testing and field validation confirming impact on structural longevity. This effect can be modeled using available service life software enabling a quantitative assessment of the benefits of corrosion inhibitors. The unique ability of amine carboxylate corrosion inhibitors to provide protection at crack locations is a notable benefit that make them a true second line of defense.

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