



**Ash Development
Association of
Australia**

THIS ISSUE - MAY 2014

- 1 Editorial
- 2 Member Employee Profile - Darren Essex
- 3 Awards: Daksh Baweja recognised as a Fellow of the American Concrete Institute
Research: US EPA Finds Coal Fly Ash Safe in Concrete
Awards: United Nations Association of Australia Environment Day Awards 2014
- 4 15 minutes with Jamie North
- 5 Research: Fly Ash as Water Purifier
Update: CPP Handbook
- 6 Conference: Concrete 2015
World Record: Largest Continuous Fly Ash Concrete Pour
Update: CRC for Low Carbon Living (CRC-LCL)
- 7 Conference: Coal Ash Asia 2014
Conference: 23rd Australasian Conference on Mechanics of Structures and Materials
Conference: International Workshop on Agricultural Coal Ash Uses, Israel 2014
- 8 Conference: Construction Materials Industry Conference (CMIC) 2014
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14
MAY

CCPs - a valuable resource

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Editorial

It is hard to believe that Easter has already passed for 2014 and our focus is shifting towards the latter half of the year for us here at the Ash Development Association of Australia (ADAA). This edition of *Coal Ash Matters* (CAM) takes a different path by looking at innovations in the use of coal combustion products (CCPs) which has been a strong strategic focus of the Association. Case in point, the Association's long term commitment to the \$101 million CRC for Low Carbon Living is a testament to this innovation stance with strong advocacy for the development and use of geopolymers within which coal combustion products are an integral ingredient. This issue we have an update from our CRC research partners on recent projects funded for the next two years.

Continuing our commitment to showcase members and their employees, this edition we profile Darren Essex from Holcim (Australia) Pty Ltd to the ADAA National Technical and Education Committee. Darren brings over 20 years of industry experience to his role of Business Development Coordinator and a different perspective on the uses available for CCPs in quarrying products.

As an alternative to the highly technical articles that usually make their way into CAM, Jamie North provides an insight into the use of CCPs in sculpture as a growth medium to emulate the built environment on a small scale. The Association would also like to congratulate him on his recent award of the NSW Visual Arts Fellowship for Emerging Artists Exhibition and will spend 2014 in the US comparing and working with the different types of CCPs there.

Members and interested readers are avidly awaiting the publication of the Revised Coal Combustion Products Handbook which is due for release mid-year. This is an important legacy document that has been 2 years in the making. The Association also hopes to produce an interactive 'Factbook' to supplement the printed edition by summarising the content for readers new to the CCP field.

Finally, in this edition we highlight a number of conferences across the globe to look forward to in 2014 and 2015 including the Concrete Materials Industry Conference (CMIC 2014) in Brisbane, Coal Ash Asia 2014 in China, International Workshop on Agricultural Coal Ash Uses in Israel, 23rd Australasian Conference on Mechanics of Structures and Materials and Concrete 2015 to be held in Melbourne. Each of these events offer valuable networking forums and opportunities for the exchange of technical knowledge in the areas of CCP utilisation and future innovation. More information is provided later in this edition.

On a final note, the ADAA would like to wish members all the best with their pursuits throughout 2014 and we look forward to bringing you a summary of the year in review for the November edition.



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Membership

COMPANY MEMBERS

A primary role of the ADAA is to bring together producers and marketers of coal combustion products (CCPs). Our activities cover research and development into CCP usage, advocacy and technical assistance to CCP producers and users, as well as a forum for the exchange and publication of CCP information.

For more information on the Association, visit us at

www.adaa.asn.au

- Adbri Masonry
- Adbri Resources
- Alinta Energy Group Ltd
- Bulk Flyash Grouts Pty Ltd
- CS Energy Ltd
- Delta Electricity
- Eraring Energy
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RELATED ASSOCIATIONS

- CSIRO www.smit.csiro.au
- Association of Canadian Industries Recycling Coal Ash (CIRCA) www.circainfo.ca
- UK Quality Ash Association www.ukqaa.org.uk
- American Coal Ash Association www.acaa-usa.org
- World Wide Coal Combustion Products Network (WWCCPN) www.wwccpn.org

MEMBER EMPLOYEE PROFILE

Darren Essex (Holcim)

Holcim (Australia) Pty Ltd is a leading supplier of aggregates, readymix concrete, pipes and other precast products. Darren Essex is the Business Development Co-ordinator for the Sydney area and having recently been appointed to the ADAA National Technical and Education Committee Meeting, he provides an insight into his 20 years of experience in the industry.

How did you come to work at Holcim and what have you learnt there?

This is the second time I have worked for Holcim. I originally worked for Holcim back in the CSR Readymix days as a Quarry Supervisor and Safety, Health and Environment (SHE) Co-ordinator at the Albion Park Quarry. This was my first role in the quarry sector with my previous experience being primarily in the pipe and precast industry and as a consultant conducting occupational hygiene assessments. It was a fairly sharp learning curve in understanding the various technical and operational aspects of winning and processing rock. The high level of focus on safety in the Readymix quarry environment also allowed me to develop my skills as a SHE co-ordinator in a proactive workplace that was highly supportive of the SHE function.

After stints at Boral and Metromix in OH&S related roles, I returned to Holcim in the role of Business Development Co-ordinator for the Holcim Sydney and West Aggregates Team. In this role I have vastly increased my level of understanding of operational improvement, project management, sales, technical product knowledge and finance. The role is extremely varied and includes the development of new products, increasing operational efficiency, investigation of new resources, project management, cost management initiatives, market analysis and purchasing.

What is the importance of coal combustion products (CCPs) to your industry?

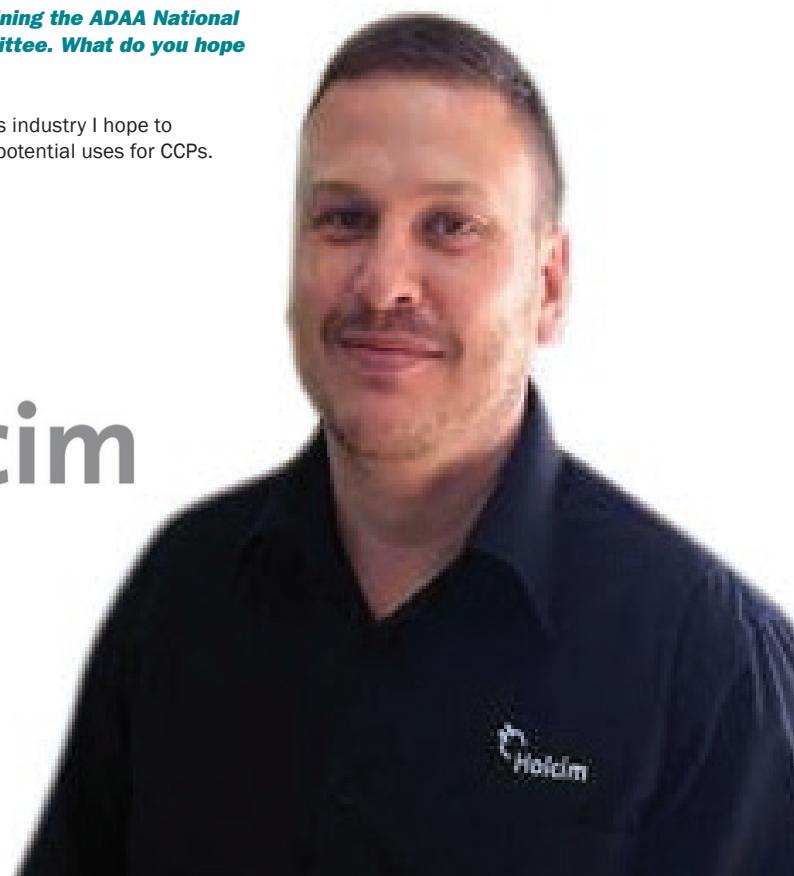
I have been involved in the successful development and marketing of natural road base products using run-of-station (ROS) ash. We are currently producing Roads and Maritime Services (RMS) compliant road bases at 3 of our NSW businesses using ROS ash as an additive of between 5-10% volume. We also see a future for CCPs in our stabilised road bases as an opportunity for further innovation.

How did you develop your technical knowledge?

My Bachelor of Applied Science in Environmental Science probably provided the grounding for much of my approach to technical applications. My technical knowledge has been developed from a range of areas from formal education to practical applications in the workplace throughout my 20 years of experience.

Congratulations on recently joining the ADAA National Technical and Education Committee. What do you hope to bring to the Association?

Through my focus in the aggregates industry I hope to provide an alternative view on the potential uses for CCPs.



AWARDS

Daksh Baweja recognised as a Fellow of the American Concrete Institute

Association member, Daksh Baweja of Engineered Material Solutions, was recognised at the recent American Concrete Institute (ACI) Spring 2014 Convention in Reno, USA during March 2014. In particular, his recognition as a Fellow of the ACI was a result of his 'outstanding contributions to the production or use of concrete materials products and structures in the areas of education, research, development, design, construction or management.'

It is pleasing to see Dr Baweja, one of our most well respected concrete scholars "down under", receiving such a prestigious honour from the ACI. Daksh was one of 25 ACI members that were honoured at the Convention. His other achievements include:

- Past President of the Concrete Institute of Australia (CIA) and Life Member in 2013
- Fellow of Engineers Australia
- Master and PhD in civil engineering from University of Sydney which were both directly related to CCPs

The Association would like to congratulate Daksh on this achievement both as a member and a significant contributor to the Technical and Education Committee.

For more information on the ACI, please visit: <http://www.concrete.org/default.aspx>



RESEARCH

US EPA Finds Coal Fly Ash Safe in Concrete and Gypsum Wallboard

The US Environmental Protection Agency (EPA) are expected to finalise their regulation for the use of fly ash by December 2014. An important part for the determination of the relevant parameters in the regulation can be derived from studies, one of which was released by the EPA in March of this year.

The study found that although the lowest mercury emanation rate that was measured in gypsum wallboard containing fly ash was three times more than that found in mined gypsum wallboard, the rates were still within regulatory benchmarks and were therefore safe for use.

It is important to note that Australian fly ashes are significantly different in terms of the chemical characteristics in comparison to ashes produced in the United States which are extremely sulfuric in nature. However, this story does demonstrate that the use of what has otherwise been previously termed as a 'waste product' in a precautionary legislative environment is safe for use. In contrast, there is now some market certainty for future areas of beneficial utilisation of fly ash in other Western countries.

For the complete article, please visit: <http://www.buildinggreen.com/auth/article.cfm/2014/3/20/EPA-Finds-Coal-Fly-Ash-Safe-in-Concrete-and-Gypsum-Wallboard/>

AWARDS

United Nations Association of Australia Environment Day Awards 2014



Nominations for the United Nations Association of Australia (UNAA) Environment Day Awards are now open!

The aim of these awards is to recognise the achievements of participants from all Australian industry sectors in their contributions to environmental projects. Themes of innovation, dedication, environmental leadership and awareness for global environmental issues. Nominations have now closed for 2014 but keep your eyes peeled for next year.

For more information, please visit: <http://www.unaa.org.au/awards-programs/world-environment-day-awards/>

15 minutes with JAMIE NORTH

What kind of work do you do?

I do sculpture and photography that to date have involved indigenous plants in states of transformation.

How did you get involved in sculpture?

I started to get involved in sculpture as a way to work through some ideas that I was having. I used to make sculpture when I was in school though left it behind, and have come back to it in the past 6 years.

What kinds of materials have you used before?

I have used mostly concrete as a medium, with various mixes and aggregates. The concrete sculpture becomes a housing for the native plants that I use in my works.

What led you to have an interest in industrial by-products/co-products, specifically the use of fly ash and slag as materials?

I guess many roads led to this. Fly ash and slag have traditionally been used in concrete manufacture, so I was eager to try both of these in blends to achieve desired outcomes in terms of final concrete composition, though also environmental outcomes.

What aspects of fly ash do you find favourable to work with?

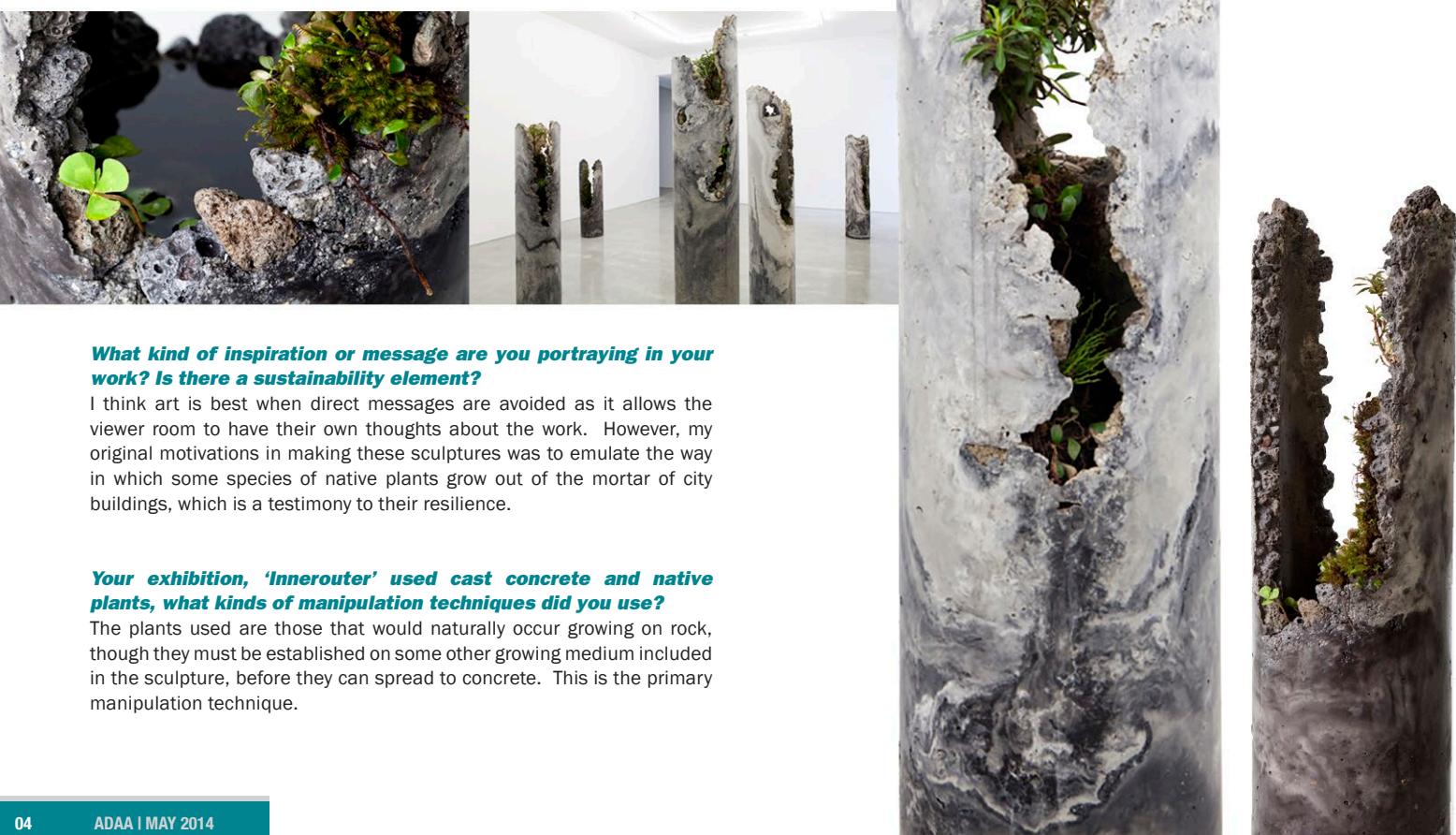
Fly ash can displace the amount of cement I use so it is better for the environment, though also seems to improve the workability of the mix.

Different types of fly ash will have a variation in colour and consistency, did this effect your selection of the material?

When I use fly ash I use a standard bagged fly ash which seems to be fairly consistent. I have not moved greatly beyond this product in terms of fly ash.

Did you have any difficulties when working with fly ash?

No, not really.



What kind of inspiration or message are you portraying in your work? Is there a sustainability element?

I think art is best when direct messages are avoided as it allows the viewer room to have their own thoughts about the work. However, my original motivations in making these sculptures was to emulate the way in which some species of native plants grow out of the mortar of city buildings, which is a testimony to their resilience.

Your exhibition, 'Innerouter' used cast concrete and native plants, what kinds of manipulation techniques did you use?

The plants used are those that would naturally occur growing on rock, though they must be established on some other growing medium included in the sculpture, before they can spread to concrete. This is the primary manipulation technique.

What were your reasons for incorporating various native plant species into your work?

I'm personally very interested in native plants and the possibilities around them. I do think they are greatly under-appreciated and they have a lot to tell us about the place in which we live. I wanted to celebrate them and grow them in a way that was unconventional and challenging.

Was there any particular reason for showing both the external and internal surfaces of the cast concrete?

Yes. I like the contrast between the smooth lifeless outer and the coarse, more organic inner concrete. Also, as the plants grow inside the work, they are more likely to adhere to the coarsely finished concrete rather than the smooth.

Your work was described as a 'series of idiosyncratic concrete jungles...pulled from the fabric of the local urban environment – reminding the viewer of those moments when you come across some plant life pushing through a broken bit of footpath.' What is your response to this critique?

I think this is a good introduction to the work.

For more information on Jamie North or to view his work, please visit: <http://www.jamienorth.com>

RESEARCH

Fly Ash as Water Purifier

Methods for the filtration of water, especially in impoverished countries where both water quality and the money to alleviate the problem are low, are necessary but often too expensive. For example, 2012 statistics show that less than 50% of all households in Nepal have some method of water purification with even lower numbers in rural areas.

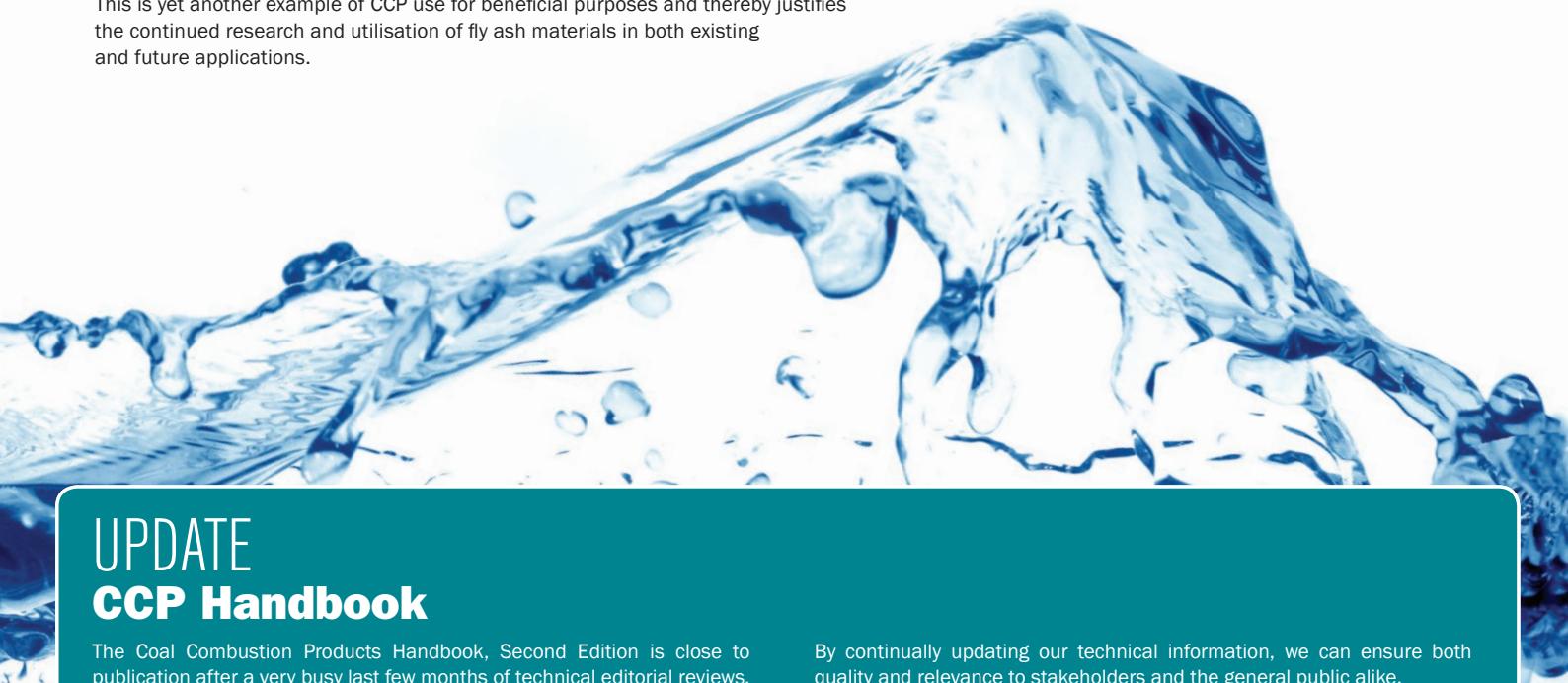
Therefore, there is a demand for the design and creation of a water filtration method that is both cheap and effective- here enters fly ash. Scientists from Nepal's Tribhuvan University and South Korea's Chonbuk National University and Hanyang University have developed a nanomembrane filter made out of fly ash and polyurethane with a silver nanoparticle coating.

The distinctive 'spider-like membrane' that is described in the Report titled 'One-step fabrication of multifunctional composite polyurethane spider-web-like nanofibrous membrane for water purification' was published in the *Journal of Hazardous Materials*. The specific benefits of this technology are:

- Absorbs arsenic and dyes
- Kills disease-causing microorganisms
- Antibacterial
- Better purification than conventional filters due to its ability to capture particles large than pore-size due to the higher surface area
- Cheaper in comparison to conventional filters as fly ash is a waste material

This technology can also be compared to other water filtration technologies that involve the use of zeolites. However the nanomembrane filter can be distinguished from zeolites as they are used for rudimentary filtration rather than drinkable water purification. For more information, please see Chapter 10: *Fly Ash in Zeolite Production in the Coal Combustion Products Handbook*.

This is yet another example of CCP use for beneficial purposes and thereby justifies the continued research and utilisation of fly ash materials in both existing and future applications.



UPDATE CCP Handbook

The Coal Combustion Products Handbook, Second Edition is close to publication after a very busy last few months of technical editorial reviews. Authors and editors alike have been working to complete the content for each Chapter to then submit it to our Technical Editor for scrutiny.

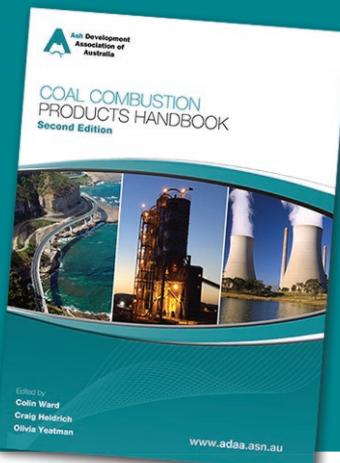
Despite the long process, it is important to reiterate the original aims of the update which was to ensure that any existing information as well as new information on the CCP industry was timely and relevant to current applications. This coupled with research on market developments and the distillation of trends has demonstrated that the use of CCP products is still a growth area with many more applications yet to be discovered. This new research also incorporates legislative changes in the form of exemptions that give regulatory certainty to the usage of these materials in the long-term.

The final stages of the project require final review of Chapters 1, 4 and the Glossary of Terms, pre-production tasks of type-setting some 500 pages, proofing, printing and finally publication.

The ADAA would like to again thank the authors, contributors and members for their commitment and contributions to the long-term project. Special thanks goes to Professor Colin Ward, Chief Editor and Technical Editor, Stephanie Butcher for their many hours of content development and review.

By continually updating our technical information, we can ensure both quality and relevance to stakeholders and the general public alike.

Copies of the Coal Combustion Products Handbook, Second Edition will be available to members free of charge with additional copies available for purchase through our website: <http://www.adaa.asn.au>



CONFERENCE

Concrete 2015

The leading conference of stakeholders of the concrete industry has been scheduled again in 2015, from 30 August-2 September 2015 at the Pullman, Albert Park in Melbourne.

The theme will look to the nature of construction innovations as putting *Research into Practice* in relation to materials, design, construction, performance, innovation and the associated research to support further development in these areas.

The Association will be in attendance and manning a stand in the exhibition hall and we encourage our members to firstly attend and secondly, to come over and visit during the conference proceedings.

Future editions of Coal Ash Matters will continue to provide updates including registration and the formalised program. Initial details in relation to the technical program and more general information are available on the conference website: <http://www.concrete2015.com.au>



WORLD RECORD

Largest Continuous Fly Ash Concrete Pour

In February this year, the record for the world's largest continuous concrete pour was broken in Los Angeles, California. The new record of 16,208.6 m³ was achieved during the pouring of the foundation for the Wilshire Grand Centre in Los Angeles.

This building, on completion, will stand at 335 m tall hence the sheer mass of concrete needed for the foundations. The pour took 18 hours with 208 individual trucks delivering from 8 production centres and involving 19 separate pumps and 13 hoses.

Fly ash was supplied by Headwaters Incorporated and substituted at 25% with the ash originally produced at power plants located in Utah and Arizona. Despite the different types of ash and legislative environments that operate in the United States, the US EPA has used this successful project to affirm its support for the continued use of fly ash in concrete as it "...offers significant opportunities to advance sustainability."



UPDATE

CRC for Low Carbon Living (CRC-LCL)

In 2014, the CRC for Low Carbon Living continues to forge ahead with its innovative research on geopolymers as one of the most promising high volume applications of fly ash.

The 2013 Scoping Study identified that the major barriers to geopolymers adoption was the lack of standard specifications, track record and exclusion from current standards (e.g., AS 3600). The project submitted to the CRC-LCL in 2014 aims to gather field data from real-life geopolymers constructions to develop greater confidence in geopolymers use. Using the field and laboratory data, a comprehensive Handbook for geopolymers specification will be developed and published through Standards Australia.

Additionally, a pilot program will develop lightweight aggregates based on fly ash to produce lightweight concrete which reduces energy usage in buildings. Current technologies for producing lightweight aggregates using sintered fly ash involve carbon intensive processes. This project aims to develop low carbon processes based on geopolymers and alternative methods for producing aggregates from fly ash.

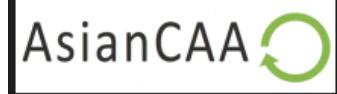
Partner organisations include the University of New South Wales, Swinburne University of Technology, ADAA, Australasian (iron & steel) Slag Association (ASA), AECOM, Sydney Water and Standards Australia. The project coordinators also obtained letters of support from the main Australian geopolymers suppliers, Zeobond Pty Ltd and Wagners Concrete Pty Ltd, as well as RMS Pavement Structures, Transport and Main Roads QLD, VicRoads and Milliken Infrastructure Solutions.

In February 2014, this new project was approved by the CRC-LCL Board with a cash contribution of \$1.1 M in combination with in-kind contributions from partner organisations of \$1.8 M.

The Ash Development Association of Australia will continue to keep members abreast of any updates on the CRC-LCL throughout 2014. For more information, visit: <http://www.lowcarbonlivingcrc.com.au>



CONFERENCE Coal Ash Asia 2014



Coal Ash Asia, a conference run by the Asian Coal Ash Association is scheduled for 24-27 September 2014 in Shuozhou, Shanxi Province, China.

Tentative speakers have been selected with over 500 attendees from over 15 countries expected at the conference, exhibition and seminar series. Participants will include researchers, managers, technology providers, technology buyers, power producers and government, all of which will share their technical knowledge and experience on the challenges and opportunities for CCP utilisation.

Registrations are now open!

For more information, please visit: <http://www.asiancoalash.org/caa2014/>

CONFERENCE 23rd Australasian Conference on Mechanics of Structures and Materials

The 23rd Australasian Conference on the Mechanics of Structures and Materials (ACMSM23) will be held in Byron Bay, NSW from 9-12 December 2014, organised by Southern Cross University.

This conference is a well-known forum that focuses on the latest trends and developments in the fields of structural mechanics and materials. Both practitioners and researchers alike are invited to this event in the beautiful seaside town of Byron Bay. This town in particular demonstrates some of the problems that are faced in the built environment from a number of factors including population migration, sea level rise and adverse human-induced environmental actions.

There are a number of key dates:

- **Submission of Papers for Review:** 15 June 2014
- **Submission of Camera Ready papers:** 15 August 2014

For more information, please visit: <http://www.scu.edu.au/acmsm23/>



CONFERENCE International Workshop on Agricultural Coal Ash Uses, Israel 2014

From May 27-29 2014, the International Workshop on Agricultural Coal Ash Uses will be held in Bet Dagan by the Israel National Coal Ash Board (NCAB).

This conference will focus on the enhancement of soil fertility by the addition of ashes that was practiced by many ancient European civilisations. CCPs also have the highest rates of production as an industrial waste hence effective utilisation is an important part of the management of this co-product. International stakeholders have been invited from around the world to participate in the workshop through the exchange of technical knowledge and group analysis of the benefits and risks associated with the use of CCPs in agricultural applications.

Association National Technical & Education Committee Member, Jane Aiken of LLIS Industrial has accepted an invitation extended to the Ash Development Association of Australia. Jane will be attending and presenting a joint paper with CEO, Craig Heidrich on the *Market Opportunities for Coal Ash within Australian Agriculture* on behalf of the ADAA. This paper seeks to establish a basis for the sustained use of CCPs for addition in agricultural applications from a marketing perspective in establishing a "...unified industry commitment and support for the use of coal ashes."

For more information, please visit the Conference Page on the ADAA website: <http://www.adaa.asn.au/conferences.php>. Also please visit the Israel National Coal Ash Board website: <http://www.coal-ash.co.il/english/about.html>

CONFERENCE

Construction Materials Industry Conference (CMIC) 2014

The Construction Materials Industry Conference (CMIC) 2014 will take place this year from Wednesday 3 to Saturday 6 September at the Brisbane Convention and Exhibition Centre located on the iconic South Bank.

The theme for this conference is *Building Productivity* which aims to explore the changing business environment in Australian industry where each aspect of your business will be challenged by the structured technical program.

The keynote and plenary speakers have been announced with a number of other important dates:

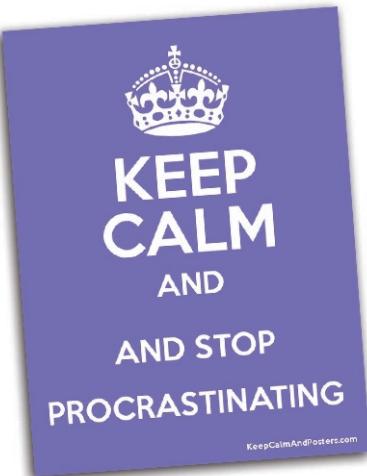
- **March 2014:** Call for Abstracts Closes
- **April - June 2014:** Early bird registration
- **May 2014:** Speakers notified of Abstract status

The ADAA will be in attendance with significant value derived from the networking opportunities in the Exhibition Hall. We encourage our members to attend and take advantage of the valuable networking and knowledge transfer opportunities provided. This in turn builds on the educational and technical foundations of the Association in the long term.

For more information, visit: <http://www.iceaustralia.com/cmic14/>



Get writing for Coal Ash Matters!



Coal Ash Matters is the Association's main educational publication that is produced twice a year for the benefit of ADAA members and to also create further understanding in other industry stakeholders and the community. Before each publication is drafted, an email is sent out to all members, urging them to contribute stories that they think are of interest. The types of content we are looking for include:

- New developments or technologies
- New projects
- New employees

We also have a Member Profile section which is open to all member companies for contributions on behalf of the business in general or a specific employee.

So, if you have an idea or even some content that you think might make an interesting article for our readers, get in contact with Editor Olivia Yeatman today: research@hbmgroup.com.au



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