asa connections
australasian (iron & steel) slag association
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Editorial

In this edition we continue our important role in updating readers about recent developments within the use of iron and steel slags. Examples from 2014 include; steel furnace slag (SFS) reducing accidents on Sydney's roads; $3.1 million CRC Low Carbon Living projects; the Northern Road upgrade and publishing Quick Reference Guide (QRG:3).

This year we are proud to introduce *Connections Selections*, a quarterly e-blast distributed to our +1,600 registered subscription list members - designed to keep our readers up-to-date with current news and issues from around Australia and the Globe. *Connections Selections* hopes to provide a more timely focus on slag news and articles that will further develop in subsequent Connections editions.

Taking a quick glance at the global economy and associated impacts for Australia, 2015 continues to face some challenges. China continues its transition from a building and infrastructure growth model to a consumption (consumer spending) model. Meaning that demand for various commodities and resources, in particular Australian iron ore, steel and coal are forecast to decline, with many of these factors having some minor impact on iron and steel slag production.

Ironically, while natural resource consumption slows, the demand for co-products such as iron and steel slags continues to grow. That is, more than 92% of iron and steel slags (ISS) produced throughout Australasia were effectively utilised last year, with future value added benefits for ISS looking even brighter.

The member profile for this edition focuses on Gavin Tory who recently joined Australian Steel Mill Services as the Manager of Sales and Business Development. Gavin has worked for companies such as Esso and Caltex in areas such as technical products and consumer marketing.

We also highlight some new iconic projects and developments for ISS, including the completion of the Omega Bridge in Gerringong on the South Coast of NSW, update from the Cooperative Research Centre for Low Carbon Living (CRC-LCL) as well as research into ancient forms of concrete and future methods of building and construction.

Over the coming year there will be an array of conferences which are sure to keep members abreast of current research and issues in the construction materials sectors. For those of you not planning to attend these conferences we will provide a report in subsequent editions. In this edition we report on the 23rd Australasian Conference on the Mechanics of Structures and Materials and 10th Global Slag Conference & Exhibition where Australian innovation has been show cased and recognised. Information about upcoming conferences such as Concrete 2015, 11th Global Slag Conference and the International Concrete Sustainability Conference is also included.

On a final note the Association wishes you a happy and safe Easter period and we look forward to working with you in 2015 to further the value added benefits from the iron and steel slag industry.

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FIVE MINUTES WITH GAVIN TORY

How did you get involved with Australian Steel Mill Services (ASMS)?

The role at ASMS caught my eye as an interesting blend of sales, business development and product marketing challenges.

Where else have you been employed?

After completing my BSc (Hons 1) in Industrial Chemistry from UNSW and my MBA from Macquarie Graduate School of Management, I had a number of Marketing, Sales and General Manager roles over my career. These roles have predominantly been in commercial and industrial markets with technical products, but with some consumer marketing thrown in too.

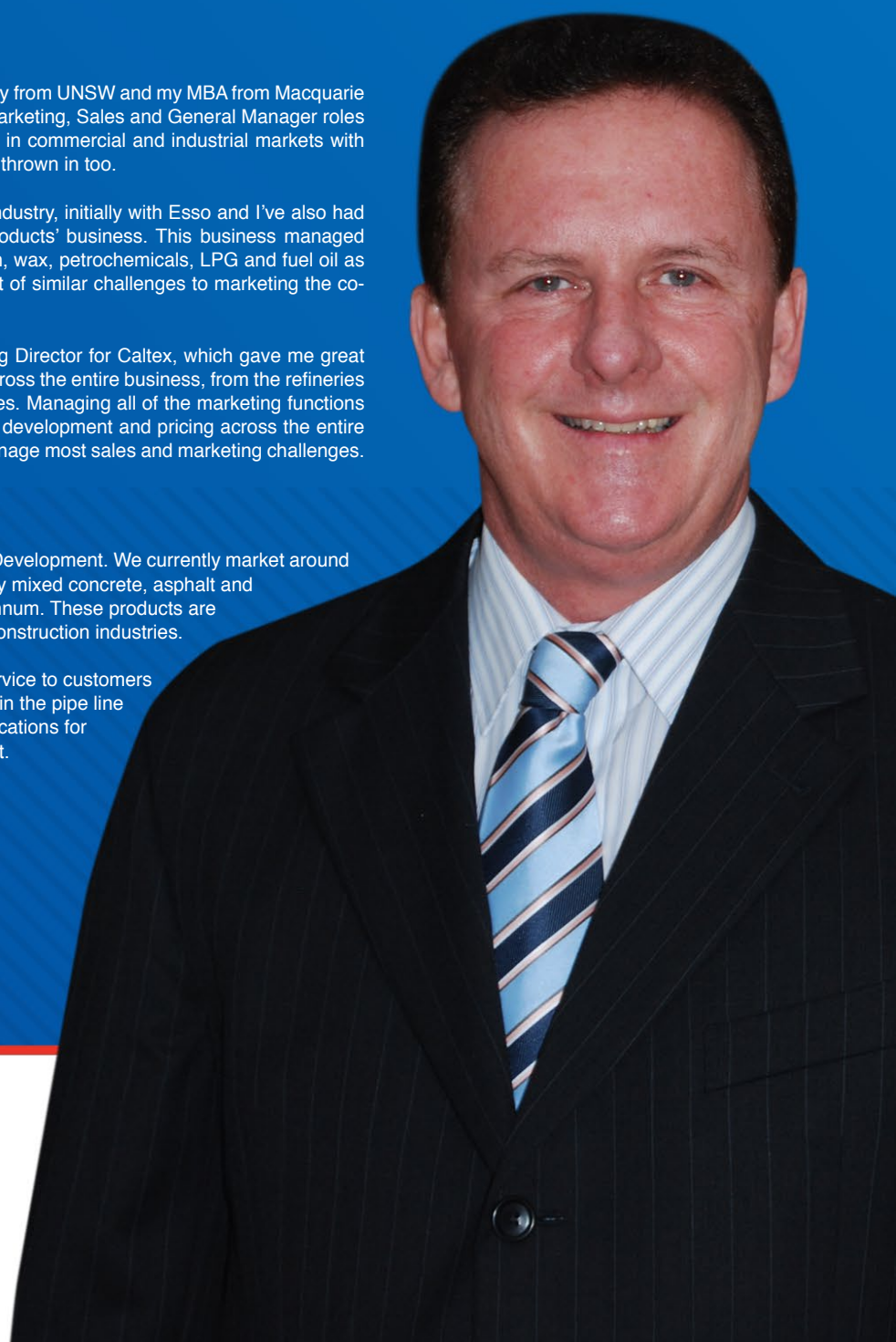
The majority of my career to date has been in the oil industry, initially with Esso and I've also had various roles within Caltex including the 'speciality products' business. This business managed ex-refinery sales of non-core products such as bitumen, wax, petrochemicals, LPG and fuel oil as well as the core lubricants business. This role has a lot of similar challenges to marketing the co-products of steel production as sold by ASMS.

After running those businesses I became the Marketing Director for Caltex, which gave me great exposure to the strategic and operational challenges across the entire business, from the refineries right through to the operation of the Convenience Stores. Managing all of the marketing functions from the brand, communications, product and channel development and pricing across the entire suite of Caltex products has established my skills to manage most sales and marketing challenges.

What is you role with ASMS?

My role with ASMS is Manager of Sales and Business Development. We currently market around 1.3 million tonnes of slag-based products such as ready mixed concrete, asphalt and cement manufacture to the construction industry per annum. These products are predominantly sold to the cement, concrete and road construction industries.

One of my key roles at ASMS will be to improve our service to customers and to the industry. We have some interesting projects in the pipe line for developing new local markets and finding new applications for steel making co-products which I am very excited about.



ASMS AUSTRALIAN STEEL MILL SERVICES

UPDATE:
Cooperative Research Centre for Low Carbon Living (CRC-LCL)

The 2013 Scoping Study identified that the major barriers to geopolymer adoption was the lack of standard specifications, track record and exclusion of geopolymer concrete from current standards (e.g., AS 3600). To combat this issue the CRC for Low Carbon Living approved the $3.1 million project, *RP1020: Reducing Barriers for Commercial Adaptation of Construction Materials with Low-Embodied-Carbon,* which spans from 2014 to 2017 and is well on track to deliver on its first milestone in April 2015.

Over the coming three years, the project will:

- Gather field data on real-life geopolymer constructions to develop utilisation opportunities;
- Develop a Handbook for use in design, specifications and construction; and
- Pilot a program for producing lightweight concrete using low carbon processes based on geopolymerisation and alternative methods for producing aggregates from fly ash.

Additionally, some initial investigations are being undertaken by Standards Australia, CRC-LCL member, towards the development of an Interim Standard for 'Low Carbon (Geopolymer) Concretes'.

Partner organisations include the UNSW, Swinburne University of Technology, ADAA, ASA, AECOM, Sydney Water and Standards Australia. The project coordinators also obtained letters of support from the main Australian geopolymer concrete suppliers: Zeobond Pty Ltd, Wagners Concrete Pty Ltd as well as RMS Pavement Structures, Transport and Main Roads QLD, Vicroads and Milliken Infrastructure Solutions.

For more information, please visit:
http://www.lowcarbonlivingcrc.com.au/about-us

LOW CARBON LIVING CRC

Jamie Watts for the CRC: LCL

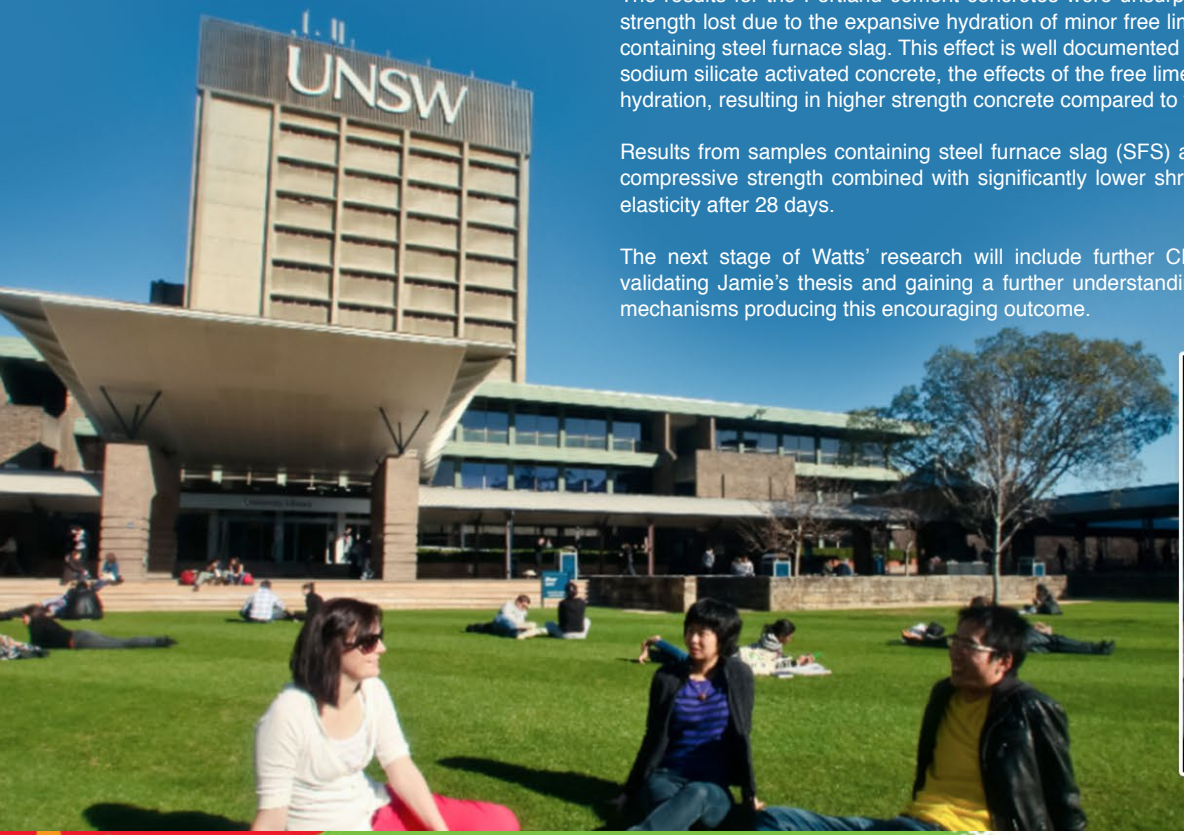
The CRC: Low Carbon Living project commenced on the 12th of December 2012. Upon its initiation it was expected to create seven beneficial outcomes by 2020, including being able to provide 88 research students with detailed experience in the low carbon built environment. One of these 88 students has recently produced his CRC funded Honours Thesis.

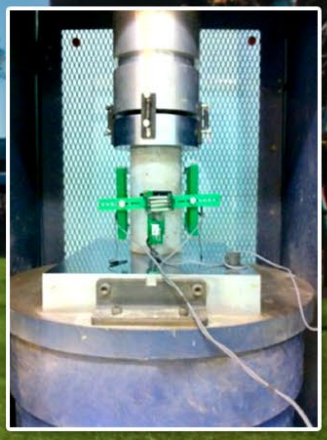
Jamie Watts, an Hon. student of Associate Professor Arnaud Castel from the University of New South Wales (UNSW), Civil Engineering department compared the performance of basalt and steel furnace slag aggregate with conventional Portland cement concrete. He also compared a sodium silicate activated concrete containing only fly ash (FA) and ground granulated blast furnace slag (GGBFS) as the cementitious binder component.

The results for the Portland cement concretes were unsurprising, with significant amount of strength lost due to the expansive hydration of minor free lime present in the concrete mixes containing steel furnace slag. This effect is well documented and understood. However for the sodium silicate activated concrete, the effects of the free lime present was suppressed during hydration, resulting in higher strength concrete compared to the basalt aggregates.

Results from samples containing steel furnace slag (SFS) aggregate returned with a higher compressive strength combined with significantly lower shrinkage and a higher modulus of elasticity after 28 days.

The next stage of Watts' research will include further CRC funded research at UNSW, validating Jamie's thesis and gaining a further understanding of the chemical and physical mechanisms producing this encouraging outcome.





Above: Compression Testing Machine

A CURE FOR CANCER, IN CONCRETE!

Concrete cancer or concrete degradation is one of the most ruinous weaknesses in modern construction. Why is it then that ancient Roman structures such as the Colosseum and the Parthenon have stood the test of time using 'outdated' methods of concrete manufacture?

A discovery made by a group of researchers has possibly answered this question. Using an X-Ray Generator to scan the layers of the 2,000 year old concrete, the team discovered that the combination of Roman volcanic ash, lime and mortar created a crystalline binding hydrate which impedes the ability of the concrete to fracture or crack.

Mary Jackson, a scientist from the University of California who led the study said that "the mortar resists micro-cracking through *in situ* crystallization of platy stratlingite, a durable calcium-alumino-silicate mineral that reinforces interfacial zones and the cementitious matrix." Due to the smooth surfaces of the stratlingite crystals, no corrosion is yet to be seen. These results suggest that the crystal structures created from the volcanic blend are the key to the longevity and endurance of these ancient concrete structures.

Sadly, in Australia we are not at the footstep of an active volcano… however Jackson believes that the future challenge for other scientists and researchers will be to "find ways to activate 'alumino-silicates', such as slag, in innovative concretes so that these can develop stratlingite reinforcements in interfacial zones like the Roman architectural mortars."

To read more about the experiment, click visit: http://newscenter.lbl.gov/2014/12/15/roman-architectural-concrete/

Quick Reference Guide 4: Electric Arc Furnace Slag (EAFS)

The review of the Guide to the Use of Iron and Steel Slag in Roads continues in 2015 with the development of *Quick Reference Guide 4: Electric Arc Furnace Slag* (QRG 4: EAFS).

This document is currently in the initial drafting stage under the authorship of members from the ASA Technical and Education Committee and is due for publication in June 2015. Given the specialised nature of this product, we would like to invite other suitable Association members to become involved.

This Guide will include information on physical properties, applications, environmental considerations and multiple case studies.

For more information or to view the current QRGs, please visit: http://www.asa-inc.org.au/knowledge/technical-literature/technical-guides

3D PRINTERS FOR CONCRETE?

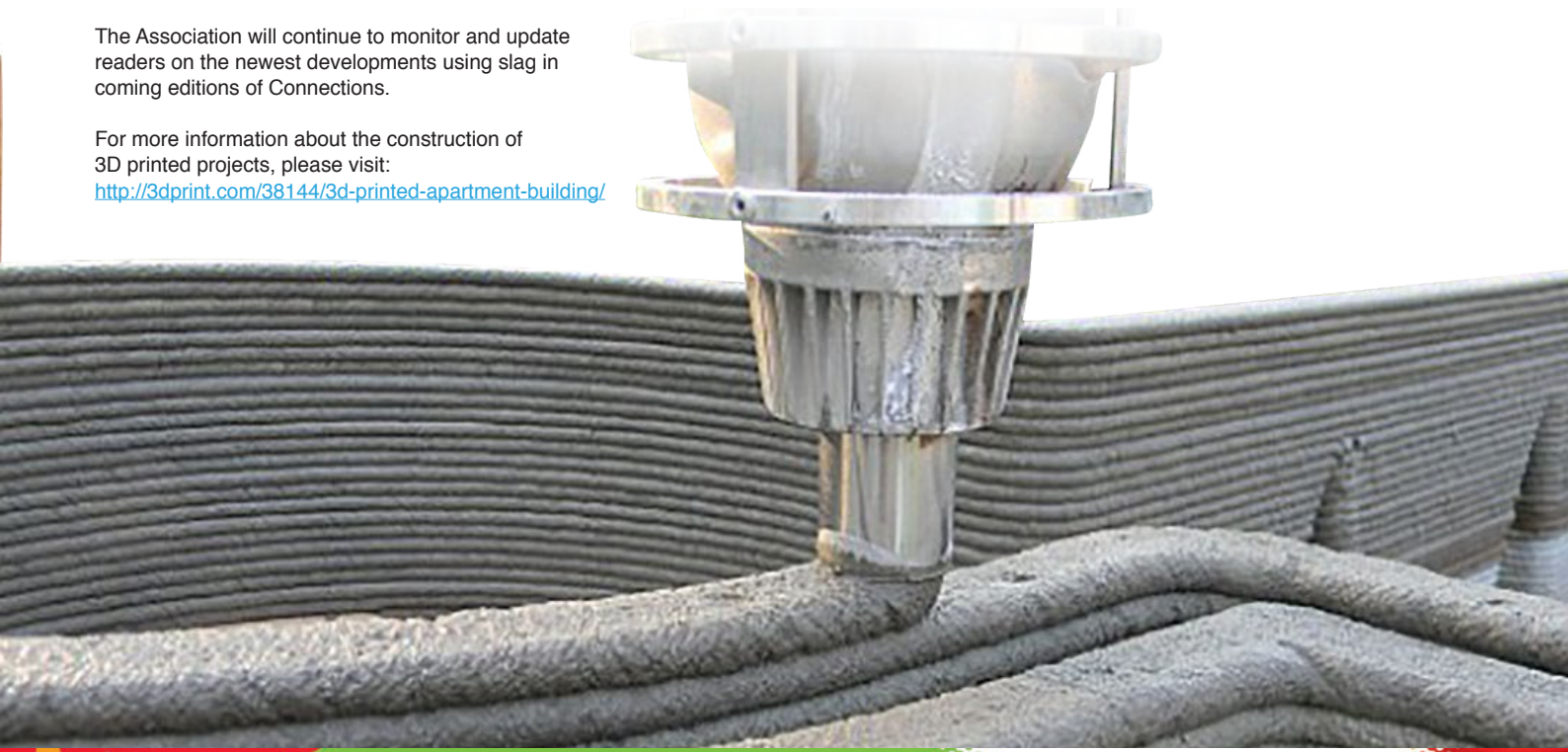
3D Printing is the process of making a three-dimensional object using a printing machine. The process involves adding successive layers of material on top of one another, using a computer system to create a three-dimensional object from a digital model. This technology has revolutionised many industries and is forecast to be a household product in the coming decades.

In 2014, 3D printers were created with the capacity to build large scale structures. This allows for commercial projects, such as homes and buildings to be completed at a fraction of the time and cost. The printers allow for materials such as slag to be incorporated into the mix which can reduce total emissions by up to 80%.

The most recent building development was WinSun's five story apartment in Suzhou, China, with each floor taking only one day to complete. The company has also produced ten houses in a 24 hour period. The company's recent success has landed them a contract with the Egyptian Government for 20,000 homes to be printed in the near future.

The Association will continue to monitor and update readers on the newest developments using slag in coming editions of Connections.

For more information about the construction of 3D printed projects, please visit: http://3dprint.com/38144/3d-printed-apartment-building/



Conference:
10th Global Slag Conference & Exhibition 2014

The 10th Global Slag Conference, Exhibition and Awards 2014 took place in Aachen, Germany, attracting 170 delegates from 35 countries. Association members, SCE Materials & Recycling, Harsco and Independent Cement & Lime were nominated for awards in the categories of Slag Product of the Year, Technical Innovation of the Year and Slag User of the Year.

James Davies, Technical and Innovation Manager for SCE Materials & Recycling, attended the Global Slag Conference and received an award for the development and supply of a heavily bound pavement material which meets regulatory requirements along with material specifications set by Roads and Maritime Services. The product (ER - MB20) uses electric arc furnace slag (EAFS) as well as a blend of other recycled products with the pavement mix to be used in areas such as road base, structural fills and hardstands.

SCE Materials & Recycling continues to research and develop beneficial and innovative ways of using EAFS and steel furnace slag (SFS) as an integral commodity within the civil construction market.

The next Global Slag Conference and Exhibition will take place in Bangkok on 17-18 November 2015. This will be a convenient location for readers to travel to attend the event.

If you are interested in speaking at the Conference, please email a proposed presentation title to the Conference Convenor, Dr Robert McCaffrey, at rob@propubs.com

Additionally, industry speakers and slag producers and users can register here: http://www.globalslag.com/conferences/global-slag/introduction

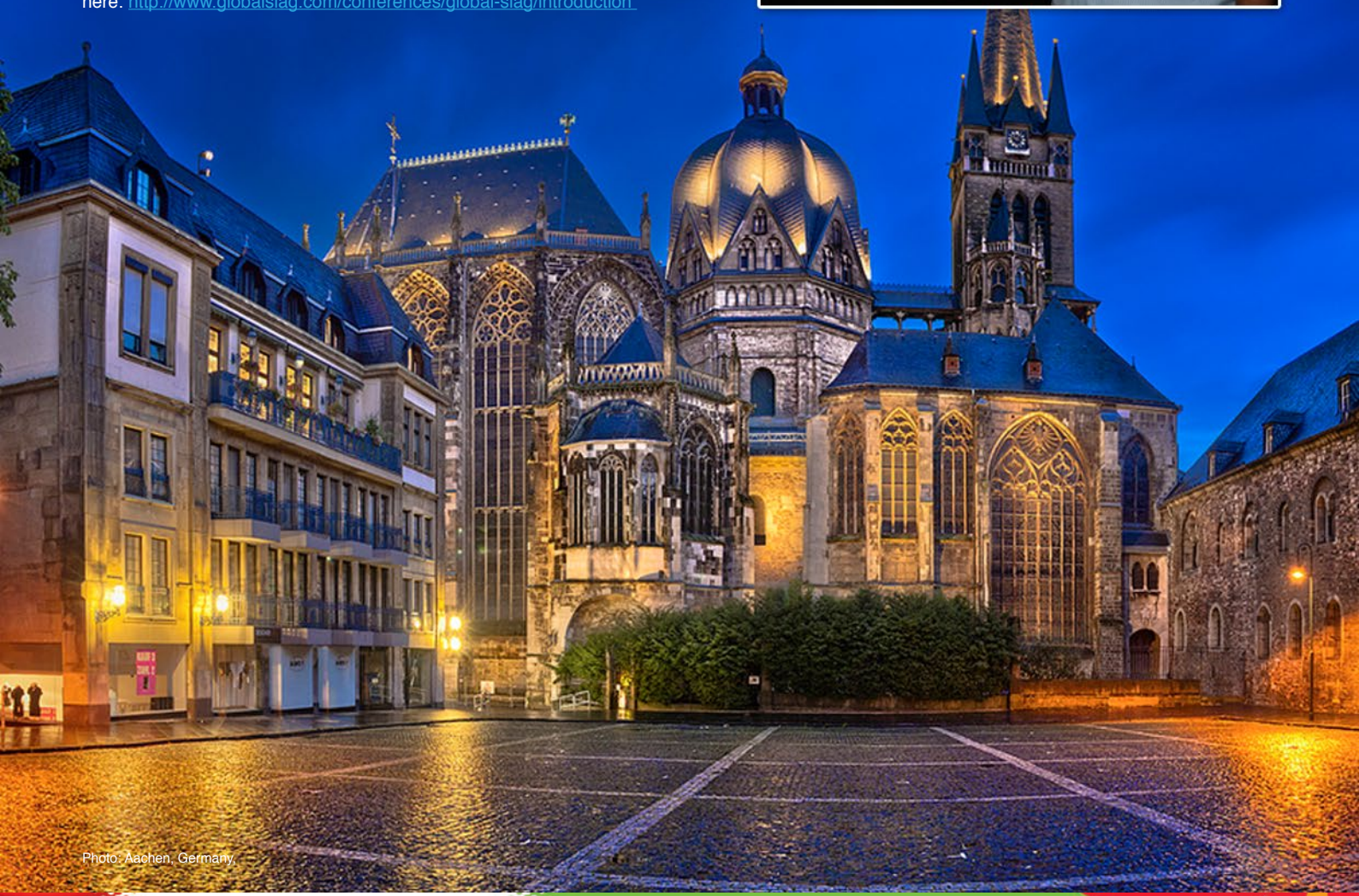


Photo: Aachen, Germany

Conference:
Australasian Conference on the Mechanics of Structures and Materials

The 23rd Australasian Conference on the Mechanics of Structures and Materials (ACMSM23) was hosted by the Southern Cross University (SCU) Lismore Campus in Byron Bay from 9-12 December 2014. The ACMSM Conference series has been running biennially since 1967 when it was first held at the University of New South Wales, Sydney.

Each year the Conference targets the similar topics of:

- Analysis and behaviour of structures under static and/or dynamic loading;
- Materials, structures and structural element studies in the field of elasticity;
- Application of computers to the analysis and design of structures; and
- Plasticity and visco-elasticity;
- Creep and fatigue performance;
- Advances in computer based applications.

The aim of the Conference was to provide a forum for the presentation of papers and discussion by authors, research workers and other stakeholders with over 180 presentations delivered including six keynote speakers. The Australasian (Iron and Steel) Slag Association, Concrete Institute of Australia, Cement Concrete and Aggregates Australia, Ash Development Association of Australia and the Amorphous Silica Association of Australia supported the Conference with information booths that were well attended during session breaks.

To read the final program, click here:
http://scu.edu.au/acmsm23/

Conference:
International Concrete Sustainability Conference

The National Ready Mixed Concrete Association is hosting the 7th International Concrete Sustainability Conference this year in May from the 11th-13th at the Intercontinental Miami Hotel, USA. The Conference invites engineers, researchers, contractors, industry professionals and all those interested to network with one another and share findings on the latest advances in research, technical knowledge, concrete manufacturing and construction.

The key dates for the Conference are as follows.

- Early registration deadline: 20 April 2015;
- Accommodation cutoff: 20 April 2015;
- Conference dates: 11-13 May 2015.

During the Conference, a 'Women in Concrete Alliance Forum' will also be held. The forum will feature a panel of guest speakers discussing the role of women in the concrete industry.

For more information about the Conference, or to register, click here: http://www.concretesustainabilityconference.org/miami2015/index.html

Conference: Concrete 2015

The theme for Concrete 2015, the 27th National Conference hosted by the Concrete Institute of Australia, is 'Research into Practice.' This event will be held at the Pullman in Melbourne's Albert Park spanning three days (30 August – 2 September) allowing industry-leading stakeholders to share their innovative research in areas including materials, construction and design. The Association will be a sponsor and exhibitor, so make sure you visit our stand.

Concrete 2015 will also be hosting the 69th RILEM Week Conference. RILEM is the highly respected International Union of Laboratories and Experts in Construction Materials, Systems and Structures and has widely published research on SCMs within the industry.

The Awards for Excellence, one of the most exciting segments of the conference, allows industry professionals to be recognised for their innovative work in areas including materials, construction and design. There are a variety of awards which span three categories, including Building and Engineering Projects, International Projects and Technology.

The Kevin Cavanagh Medal for Excellence in Concrete was last year awarded to Cox Rayner Architects, for the Australian Age of Dinosaurs Museum in Winton, Queensland. The Museum highlights the utilisation of concrete in an incredible way, demonstrating both creativity and ingenuity.

Registration for the event opened in February.

For more information please visit: http://www.concrete2015.com.au

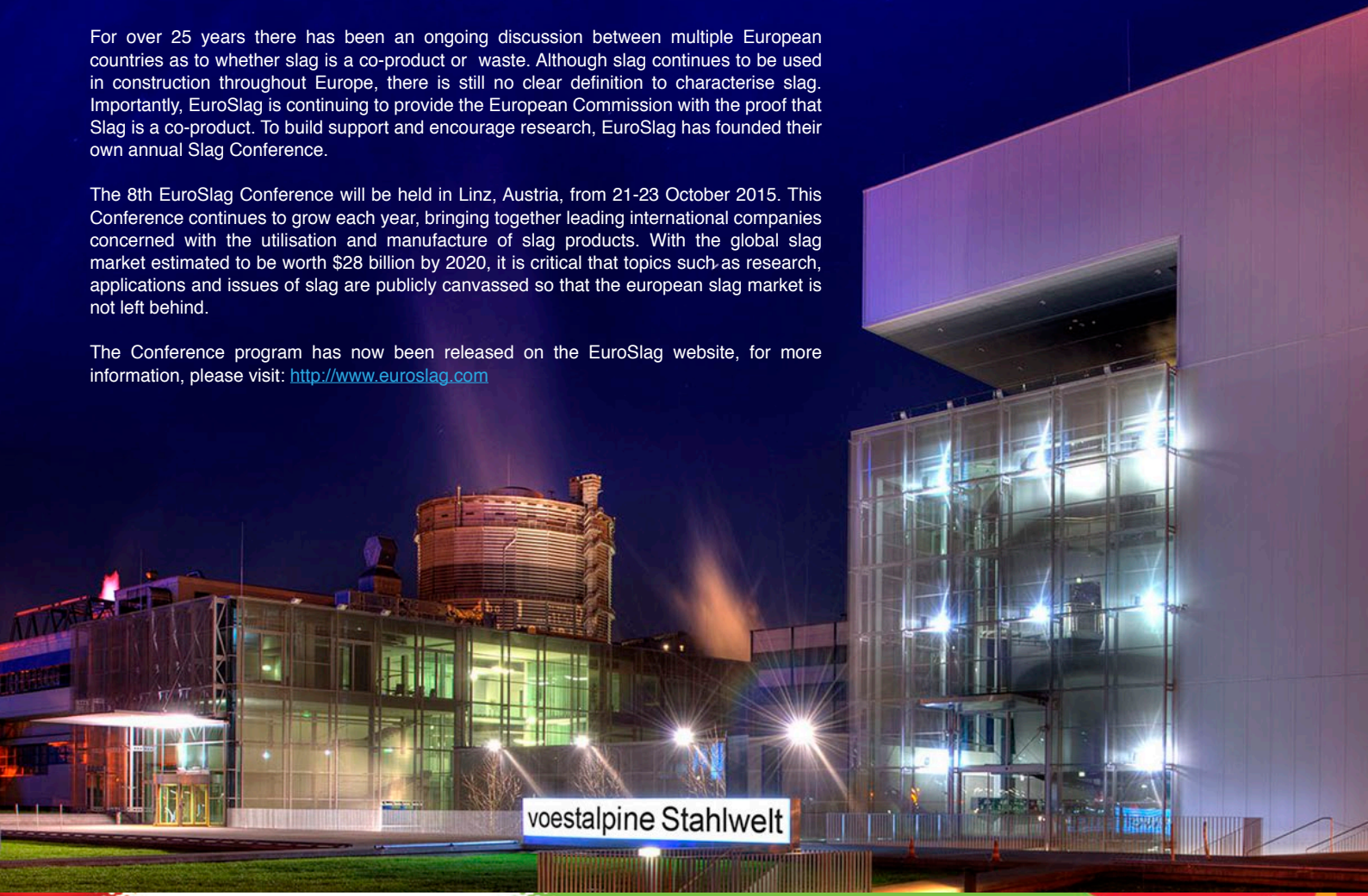
concrete 2015
30 August – 2 September
Melbourne, Australia
construction innovations:
RESEARCH INTO PRACTICE

25 to Life: The Definition of Slag

For over 25 years there has been an ongoing discussion between multiple European countries as to whether slag is a co-product or waste. Although slag continues to be used in construction throughout Europe, there is still no clear definition to characterise slag. Importantly, EuroSlag is continuing to provide the European Commission with the proof that Slag is a co-product. To build support and encourage research, EuroSlag has founded their own annual Slag Conference.

The 8th EuroSlag Conference will be held in Linz, Austria, from 21-23 October 2015. This Conference continues to grow each year, bringing together leading international companies concerned with the utilisation and manufacture of slag products. With the global slag market estimated to be worth $28 billion by 2020, it is critical that topics such as research, applications and issues of slag are publicly canvassed so that the european slag market is not left behind.

The Conference program has now been released on the EuroSlag website, for more information, please visit: http://www.euroslag.com



Slag to Win Gold at the Olympics!

Somehow another four years has almost past and the Olympics are just around the corner. In 2016 the Olympic Games will be held in Rio De Janeiro, Brazil with the biggest task for the developers being the completion of the 34 venues and stadiums spread across the city by 2016.

The United Nations Environment Programme (UNEP) agreed that the construction of the new venues needs to achieve a 100% local solid waste recycling target, as well as the inclusion of recovered resources in the construction of the venues.

The main co-products used in the construction include slag, silica fume and fly ash. The Federal University of Rio de Janeiro has also researched the potential use of more natural pozzolans such as sugar cane bagasse ash, rice husk and believe it or not, ash from burned sewage sludge! Some surprising results showed that using sugar-cane bagasse ash as a cement replacement had little effect on the performance and strength of the concrete. In fact a 10-15% blend of the bagasse ash actually increased the compressive strength of the concrete.

The research resulted in multiple co-product and pozzolanic research findings. The Federal University of Rio De Janeiro concluded that “the mechanical, hydration and rheological performance of the mixtures presented in this paper could be a blueprint for further development of ecological concrete.”

To read more about the use of co/by-products in the construction of the venues, click here: http://repository.tudelft.nl/assets/uuid:a5e0ba10-6c8d-43a3-94ba-0c3051097f28/297336.pdf

Key Dates for the Year

Due to timing issues, some of the meetings for 2015 have been shifted from their original positions. The changes can be seen below.

DATE	MEETING	TIMINGS	VENUE
4 February	Technical Education & Promotion	Technical - 10.30am to 12.30pm (Lunch) Education & Promotion - 1.00 to 3.00pm	HBM Group, Wollongong Online Webinar
25 March	Executive and AGM	Executive - 10.30am to 12.30pm (Lunch) AGM - 1.00pm to 1.30pm	HBM Group, Wollongong Online Webinar
13 May	Technical Education & Promotion	Technical - 10.30am to 12.30pm (Lunch) Education & Promotion - 1.00 to 3.00pm	Stamford Plaza, Sydney Online Webinar
10 June	Executive	10.30am to 12.30pm	HBM Group, Wollongong Online Webinar
5 August	Technical Education & Promotion	Technical - 10.30am to 12.30pm (Lunch) Education & Promotion - 1.00 to 3.00pm	HBM Group, Wollongong Online Webinar
9 September	Executive	10.30am to 12.30pm	HBM Group, Wollongong Online Webinar
11 November	Technical Education & Promotion	Technical - 10.30am to 12.30pm (Lunch) Education & Promotion - 1.00 to 3.00pm	HBM Group, Wollongong Online Webinar
9 December	Executive	10.30am to 12.30pm	HBM Group, Wollongong Online Webinar

For more information about these changes, visit: http://www.asa-inc.org.au/news-and-events/committee-meeting-schedule

WE NEED YOUR CONTENT

asap

Connections is produced biannually for the benefit of ASA members and readers. Before each publication is drafted, an email is sent to all members, asking them to contribute articles of interest. The types of content we are looking for include:

- New developments or technologies
- New projects
- New employees

So, if you have a light bulb moment or even some content that you think might make an interesting article for our readers, get in contact with Editor, Aiden Chilcott today at: marketing@hbmgroup.com.au.