

Editorial - The Australasian Slag industry: A significant contributor to the Economy

Concrete – one of the commonest of modern construction materials. Yet, as a construction material, there is evidence of its use in Rome¹ over 2000 years ago in roads and aqueducts. Just as now, concrete then contained various sized rocks (aggregates and sands) held together with a cementitious binder. The Romans built some 5,300 miles of roads using concrete and used admixtures including Pozzallana, animal fat, milk and blood as admixtures. There is evidence of slag also being used as a construction material by the Romans and in 1865 the hydraulic properties of Ground Granulated Blast Furnace Slag were first used in Germany (Lee 1956)². In 1890, The Paris underground metro was built using slag lime cement.

Today, the use of cementitious binders containing Ground Granulated Blast Furnace Slag (GGBFS) is widely available around the world, with Granulated Blast Furnace Slag an internationally traded commodity. Australia's experiences with GGBFS commenced using granulate slag from Port Kembla in the 1960's. From this beginning cementitious applications have grown to include mortars, cements and cementitious stabilisers. The North West Shelf Liquid Natural Gas project in Western Australia used slag cements with slag contents ranging from 65% to 90% of the binder material. The higher slag content material was used as a grout for the sea leg of the offshore platform (Jones 1990).

Today, GGBFS is used in many applications, in concrete at replacement levels from 25% to 65% and as a significant component of materials used for pavement stabilisation. The higher replacement levels used in concrete are often specified for structures subject to aggressive environments to improve concrete durability. There are different combinations of GGBFS available in Australia from straight ground for blending at the mixer through to varying blends and interground product depending on the application. In addition to its cementitious properties, GGBFS has been and is used to lighten the colour of concrete structures as an architectural feature. Use of GGBFS in construction also makes a positive contribution to the environment in lowering greenhouse gas production and conserving other natural resources.

In Queensland, the range of GGBFS material is to be expanded; coinciding with replacement of imported granulated slag feedstock by material from Port Kembla, a result of increased capacity at this facility. The new granulation facilities at Port Kembla bring environmental benefits and expanded production by using the most up to date of technologies. Use of GGBFS for insitu stabilisation of pavements has been in use from many years and is a well practiced art.

Cementitious properties of iron blast furnace slag also find expression in slag road pavements with their capacity to be partially self stabilising and in some cases exhibit autogenous healing of stress cracking from subsoil movements. The Global Slag Conference in Sydney during November this year and the Euroslag Conference in Madrid in October are clear evidence of both the significance and the technical and practical underpinnings of this important industry globally.

1. <http://www.howconcreteworks.com/>

2. as cited in Jones DE – *Developments in the Use of Granulated Blast Furnace Slag for Concrete and Stabilisation – Concrete for the Nineties* – Leura Australia 1990.



6th International
Global Slag Conference
Sydney 22-23 November 2010

Co-sponsored by the Australasian (iron and steel) Slag Association

DONT MISS OUT!

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CONNECTIONS EDITORIAL TEAM

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The Australasian (Iron & Steel) Slag Association Wollongong NSW 2500

Ph: 02 4225 8466 • Fax: 02 4228 1777

Email: info@asa-inc.org.au

Web: www.asa-inc.org.au

Publisher: ASA Inc. Executive Director: Craig Heidrich Editor: David E. Jones

Contributors: Jim Graham, Dan Carter, Alice Woodhead, Kevin Savory Martin Venour, Paul Newman, Craig Heidrich, David E Jones

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Berry Sports Hall Wins International Recognition

The Berry Sport and Recreation Sports Hall was announced the winner of the World Architecture Festival (WAF) awards (sport category) in Barcelona November 2009. The WAF Awards are described as 'the biggest international architectural awards program.' In its category, it competed directly with some major projects including the Wimbledon Centre Court redevelopment and the new training facility for the New York Jets football team. The hall was also recognised by the Australian Institute of Architects in 2008, winning both a Public Architecture Award (NSW) and the Blacket Prize for Regional Architecture.

The NSW Department of Sport and Recreation reports that; "Since 2007, this multi-purpose recreation hall has been a wonderful asset for local community organisations, sports groups and school children. Sport and Recreation staff worked closely with architects Allen Jack+Cottier in the design and delivery of this facility which has a modern style that's both imaginative and practical."

The hall is located in Berry, NSW (2 hours south of Sydney) covering a 60 hectare block of the lush rolling agricultural land characteristic to the town - majority of which is used for grazing. The centre proper is composed of a collection of early to mid 20th century institutional buildings, within an established landscape of gardens and mature trees. The brief was to design a simple robust multipurpose recreation hall within a tight economic constraint, providing an enclosed area for mainly primary school children during wet weather and evenings.

As described by architects Allen Jack+Cottier in its submission to the Institute of Architects Awards: 'The building is clad in durable concrete and features a creative pattern of skylight holes in the walls that admit sunlight during the day and transform the hall into a galaxy of glowing light by night. It was decided to transform the heavy off-form concrete by perforating the walls with an array of 'starlight' holes, thus giving an otherwise hard-line structure a playful edge and a new found lightness and life. Internally, the holes provide: excellent daylight, in conjunction with the heat reducing skylights, reducing the need for artificial lighting, abstracted views to the lush countryside, shafts of sunlight which change in intensity and colour throughout the day. In the evening, the light source is reversed. The building itself becomes a glowing array of starlights reminiscent of the country sky above.'

Much of the concrete produced in the Illawarra Region of NSW contains some degree of Ordinary Portland Cement replacement by Ground Granulated Blast Furnace Slag, potentially producing environmental, aesthetic and durability benefits depending on the replacement level.



New opportunities to use Slag Blended Cements (GGBFS) in Queensland

In the ongoing pursuit of providing more sustainable cementitious alternatives, last year Cement Australia re-introduced GGBFS into the Queensland market. A market whose needs have been traditionally serviced with fly ash and for which GGBFS has only been available as preblended cement, the opportunity to provide GGBFS could not be overlooked. The introduction of GGBFS has allowed increased mix design flexibility and greater sustainable outcomes for our customers, which is ultimately good for all Australians.



Initially supplying this market with product manufactured from an imported Japanese granulate, Cement Australia are now supplying the market with product which has been produced from granulate supplied by Australian Steel Mill Services (ASMS) at Port Kembla, significantly reducing delivery lead-times and allowing a level of flexibility not possible with imported material.

Cement Australia looks forward to increasing the use of GGBFS in the market and working with its customers to maximise the value of this product. Colin Zeitlyn, GM Marketing and Sales commented "I have no doubt that use of GGBFS will continue to grow, and we are excited about the contribution this will make to reducing carbon emissions, which is good for everyone."

Source: Kevin Savory - Cement Australia

Global Slag Conference comes to Sydney in November 2010

Brussels was the venue, for the 2009 Conference last November, where over 140 delegates from nearly 40 countries assembled for the 5th Global Slag conference and exhibition. Despite the Great Financial Crisis, delegates represented the world's largest slag producers, as well as the main slag users, including cement and concrete groups from around the world. In the concluding remarks of this successful event it was announced that the 6th Global Slag Conference will take place in **Sydney**, Australia, at the invitation of the Australasian (Iron and Steel) Slag Association, in **November (22- 23) 2010**. For Australian practitioners, regulators and Governments, there is a unique opportunity to make contact with practitioners and decision makers from overseas participating in this truly international business.

Main themes for the Sydney Conference are * MAKING THE MOST OF THE RECOVERY * SLAG AND SUSTAINABILITY * SURVIVING THE SLAG CRISIS * ADDING VALUE TO SLAG * GROWING MARKET SHARE * Global slag production: markets & buyers * Emissions trading * Chemical and mineralogical optimisation of slag * Steel slag for cement: the final frontier * Slag transport and shipping * Slag handling and storage * Slag crushing * Slag grinding: innovations and case studies * Slag and cement: economics, standards and case studies * Slag and slag products: applications in the construction industry

It is expected that papers will be presented by a mix of Australasian and International authors. The associated expo will showcase technologies and products from around the world. **The call for papers and exhibitors is now open.**

Preliminary details on the conference are at <http://www.propubs.com/gsc> and the call for papers has been issued with details at <http://www.propubs.com/gsc/gscallforpapers.html>

Granulation Capacity increased at Port Kembla Steelworks

Blast Furnace relines are infrequent and significant events in the life of a modern integrated steelworks such as BlueScope Steel's plant at Port Kembla NSW, only happening every fifteen years or so. During a furnace's 'campaign' life, there are ongoing improvements to keep the furnace operating at high levels of efficiency. Costing some hundreds of millions of dollars, major relines involve more than just replacement of the refractories in the furnace. The furnace is completely shut down allowing upgrade and replace ancillary of equipment and the undertaking of any necessary modernisation, all aimed at improving efficiency and as possible production capacity. This upgrade process also involves environmental improvements which take advantage of more recent advances in technology not possible whilst the furnace is operating.

During the 2009 BlueScope No.5 Blast Furnace (5BF) reline, significant capital was invested to upgrade ASMS granulation facilities. This included additional facilities to enable granulation of molten slag from all three tapholes of 5BF, granulation into a water bath rather than cold runner, a de-watering system upgrade and installation of cold water granulation equipment. This upgrade provides a potential increase in the quantity of granulate available from Port Kembla.

While none of the improvements were expected to significantly affect granulate properties, a stockpile of representative material was set aside and left to drain for a week and sent to Ecocem for a controlled mill trial.

Comparison of granulate produced pre and post reline produced the following outcomes:

- The new granulate has a higher density, lower moisture content and lower glass content than granulate produced at 5BF before the reline.
- No significant process changes were noticed when new 5BF granulate was milled at Ecocem.
- The performance of Ecocem ground from new 5BF granulate in cement mortar tests is similar to Ecocem typically produced at the plant.
- The performance of Ecocem ground from new 5BF granulate in a 32MPa laboratory concrete test mix is similar to Ecocem typically produced at the plant.

Further information on this project is available from Marc Smith at ASMS Port Kembla



Company Members

A primary role of our Association is to bring together Slag Producers, Processors, Customers & Suppliers to the Slag Industry. Our activities cover technical developments, plant operations and processes, education and promotion. If you would like more information on the Association and how you can become involved, simply complete the information section at the end of this newsletter. Current membership is as listed below.

Australian Steel Mill Services Pty
BIS Industrial Logistics
Blue Circle Southern Cement
Bluescope Steel Ltd (Port Kembla)
Cement Australia
Concrete Pty Ltd
CSIRO
HiSmelt Ltd
Holcim Pty Ltd
Holcim NZ Ltd
Harsco Metal Holdings Pty Ltd
Hunter Mill Services Pty Ltd

Komatsu Australia Ltd
Monash University
OneSteel Limited
Premium Tyre Service Pty Ltd
Roads & Traffic Authority of NSW
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Related Associations - National Slag Association (US) | Nippon Slag Association (Japan) | European Slag Association (EU)

Road Stabilisation

Sustainability can be either a slogan or a way of life that has impact. For councils and road authorities, there is an ever-increasing demand for infrastructure, particularly roads. However, the task is more than just a matter of constructing new roads; it is also how to extend significantly the life of existing ones. Insitu stabilisation of pavements that are in need of significant repair is a sustainable process in terms of overall environmental impact. By recycling the existing pavement materials, which still have a useful percentage of their original asset value, insitu stabilisation techniques deliver a range of additional benefits when compared to other rehabilitation alternatives. Benefits include:

- saving on excavation of existing materials
- saving on trucking materials off site
- saving on dumping or disposal of excavated materials which still have a real asset value
- reducing landfill usage
- reducing the usage of finite quarried replacement material
- saving on trucking replacement materials to the site
- reducing energy usage associated with quarrying and transport activities
- reduces CO2e emissions related to quarrying and transport activities

Importantly, these environmental benefits are further enhanced by the use of environmental-friendly blended cementitious binder materials such as EcoBlend, which incorporate products such as fly ash and/or slag in the blended mix.

James Howard, Marketing Manager with Independent Cement spoke with journalists from Highway Engineering Australia about Insitu Stabilisation. He explained: 'EcoBlend delivers a range of environmental benefits, including reduced CO2e Emissions' He stated 'approximately 500kg of CO2e emissions [is displaced] for each tonne of slag used as an OPC replacement.

Further information Contact James Howard Independent Cement and Lime Victoria.

Source: Highway Engineering in Australia - Dec 2009 / Jan 2010



ASA Sustainability Project: Building Capacity in the Electric Arc Furnace Slag Supply Chain

With the support of Sustainability Victoria the Australasian (iron & steel) Slag Association (ASA) has been delivering a targeted “sustainability capacity building program”. The aim is to increase the effective utilisation of EAFS products across the whole supply chain.

Slag is a valuable resource.

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Slag is NOT effectively utilised due to many factors, e.g. awareness and understanding of the resource properties and characteristics, unidentified areas for reuse and associated benefits (commercial & environmental) that can be derived. Effective utilisation by associated industries of these resources has the potential to provide long term sustainability benefits including significant carbon reduction when new products are used to displace other finite natural resources with associated ‘larger carbon footprint.’

About the project

ASA with the specialist support of Link Strategy, a sustainability policy and strategy consultancy, has engaged Victorian association members in a variety of activities taking a supply chain approach to increase utilisation of slag in existing and new product applications. One Steel, Harsco and industry stakeholders in the slag sector are participating along with numerous Victorian government agencies. These ASA member companies recognised that real benefits could accrue from the program only if they tackled inherent complexity of the supply chain; and challenged old assumptions and practices about utilising the slag in road base and other product options.

Sustainability Victoria:
Modules

- Sustainability Engagement Survey to determine attitudes, awareness, interest, current level of engagement and level of commitment towards achieving sustainability amongst members of our industry sector.
- Assessment & Benchmarking processes will measure the resource impact of slag and set benchmarks for resource use across the industry.
- Sustainability Workshops with industry and strategic supply chain partners to explore building partnerships about new products from slag.
- Building Networks A communication strategy to build relationships and the foundation for future cooperation both among industry and with supply chain producers and consumers.

Progress to date

Delivered over some 18 months (June 2009 – December 2010), two workshops and two webinars have been conducted with 32 participants attending representing several sectors of the slag supply chain including resources, producers, value adders, customers, researchers and the government.

Several new, low carbon product opportunities are under investigation and case studies are in development. The ASA continues to look for opportunities to expand the capacity of its members to increase the effective utilisation of slag in new products and or applications.

If you any questions about the program please contact Craig Heidrich, EDCEO, ASA Tel: 02 4228 1389.



AUSTRALASIAN

Association Searches for Innovative Undergraduate Students with NEW Award Program

The Australasian Slag Association (ASA) is providing an opportunity to undergraduates from Science, Engineering, Business or Environmental Law to develop a paper that investigates iron and steel slag applications. This investigation may include new uses, analysis of current technical issues, the regulatory frame work and the greater market/economic issues facing slag.

These papers will initially be submitted to the technical committee who will shortlist these papers. The authors or team that have prepared the shortlisted papers will then be asked to present their paper to the ASA with the winner receiving a cash award. Additionally as there is an international slag conference being held in Sydney this year there may also be an opportunity to present this paper at this conference. The ASA has prepared a series of topics as a guide.

Please contact us now at info@asa-inc.org.au if you are interested.

Australian Steel Mill Services (ASMS) Leadership Changes

Ian Kirk from North America has been a leading Port Kembla slag producer and marketer at Australian Steel Mill Services (ASMS) for the past 9-10 months and returns to Detroit USA in June this year. The new CEO for ASMS and ECOCEM is David Leavesley who comes from a recent background in the Cement industry through Cement Australia.



David Leavesley



Ian Kirk

ASA Elects Leadership Team for coming term

Members of the Association gathered on March 24th in Wollongong for the Annual General Meeting. Members heard of the work of the Association and its Committees, hear the Chairman's report and elected its new governing board. Executive Director Craig Heidrich and his staff, continue to support the Board, committees and the Association's membership in advocating for the use of iron and steel slag products as quality construction materials.

INTERNATIONAL

European Slag Association (Euroslag) holds 6th Conference – Madrid October 2010

After a one year delay, due to recent international economic circumstances, it is a pleasure to announce again that the 6th European Slag Conference of EUROSLAG - The European Slag Association, will be held from 20th to 22nd of October 2010, in MADRID, and is to be organised by UNESID (Spanish Steel Association).

The purpose of the Conference is to encourage the exchange of knowledge and promotion of more suitable technical, innovative, environmental sound and efficient uses on the less widely utilised slag, such as Electric Arc Furnaces for both Carbon and Stainless Steel and LD / AOD slags. An additional effort will be given to improve its use in Southern Europe.

The Conference is aimed not only at professionals already involved in the slag business, but also at people who may support slag applications in the future and those involved in the decision-making process for the use of slags. It includes steel producers, slag processors, equipment and additives providers, administration, research community in the wider sense, and users such as construction companies, cement industry, civil engineers, and developers of innovative applications.

Connections Goes Electronic

For nearly a decade the Association's Connections newsletter has been posted out to our many subscribers. Each issue reaches around 2000 readers with an increasing number accessing it online. Consistent with the Association's goal of promoting sustainability, our next issue in July will come to you electronically. This, and all future issues will only be available in this new e-format, enabling you to read it at leisure and forward to your colleagues. Publishing electronically will enable us to bring Connections to your desk much sooner. It will also conserve resources all along the supply chain from the paper, inks, packaging envelopes and transport. All in all, the environment is the main winner!

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