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Editorial

David E. Jones

The development of the Australasian Slag business has been taking place for the last fifty (50) years. The Steel Industry in Australia is located in Port Kembla, Newcastle and Whyalla. Each of these facilities was located on the waterfront on low lying land. The initial value capture came from the use of iron and steel slags to convert the low lying land into first class stable industrial land capable of supporting large structures. In the 1960's, reclamation of low lying land was almost complete so development work was directed towards finding new markets. This required changes in processing methods and the development of end products such as specified road pavements. At this stage the steel industry started to contract out slag handling and processing with the object of saving on disposal cost and developing new products. In 1966 Granulation of iron blast furnace slag began at Port Kembla. This opened up the potential of using ground granulated blast furnace slag in concrete. Since that time there have been significant developments in processing and mix designs for the various slag products.

The Steel Cement story is a real Australian success story based on the identification of a value proposition. This has extended the use of Ground Granulated Slag in Victoria.

Slag products have played and continue to play an important role in the development of Port Kembla Port. Community focus on sustainability also highlights the value proposition of slag products particularly in concrete, reducing the CO_2e footprint concrete construction.

ASA Board Changes

Following some reordering of Management responsibilities within BlueScope Steel, Jim Graham advised of changes to BlueScope Steel's Principal Representative Nomination. Given that his work responsibilities have changed, Jim introduced to the Board the new Principal BlueScope Steel Representative is Chris Page, Manager Energy and Site Services.

The Board acknowledged Jim's support and contribution to the Association's work in representing BlueScope Steel to the Board and Membership. Jim also contributed to the Association as its Chair, guiding the Association through the first International Global Slag Conference held in Sydney November 2010.

Jim's departure from the Board, created a vacancy for the position of Chair. The Board then resolved to nominate Rob Newman Managing Director of SCE Group as its new chair to serve out the current term. SCE group has been associated with the steel industry and the development of the Australasian Slag Products industry for several decades. The Board also nominated David Leavesley from ASMS as Deputy Chair. Australian Steel Mill Services (ASMS) is the largest slag processor and Marketer of iron and steel slag products in Australia. ASMS is a joint venture company between the then Queensland Cement Co and the Detroit based Levy Company.

The Association looks forward to the new team guiding it into a robust future as it continues to strongly advocate the place of Iron and Steel Slag products in Australasian construction, particularly given their contribution to durability and eco sustainability.

Image: Jim Graham

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CONNECTIONS EDITORIAL TEAM
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Steel Cement Celebrates 20 years!

Based on an article by Mike Byrne - Managing Director - Independent Cement and Lime Victoria

21st March 2011 was the 20th anniversary of the founding of Steel Cement. The very formation of Steel Cement is itself a story worth telling. The founders of Independent Cement were well informed on the usefulness of ground slag as a cement replacement. With great foresight, determination and courage they agreed to build a grinding mill at Port Melbourne. The decision to build a mill was subject to acquiring granulated slag from BHP at Newcastle. This coincided with BHP at Newcastle looking to expand its options for the use of Blast Furnace slag from its site. The decision to granulate was based BHP's desire to capture the increased value that Granulate offered over rock slag.

The contract entered into with Steel Cement BHP added greater value for the granulate and presented Steel Cement with a very large quantity of granulate to be sold as road base in the Hunter or shipped to the mill at Port Melbourne.

The Japanese company, UBE Industries, became a shareholder and supplied the modern vertical roller mill. The Japanese personnel worked alongside Steel Cement's contractors and staff that included Alan Dow, Phil Ireland, Alf Frommer, Wayne Tuddenham & Dave Lambrick. The former have many great memories of their time in Melbourne and several recently visited for a 20th anniversary dinner. Following the opening of the plant, the market for cement in Victoria collapsed and the company struggled through a most difficult era.

Losses mounted and the efforts to meet Steel Cement 's obligations to remove granulate proved onerous. A shipload was even stored in the Mountain View Quarry (Barro Group) at Point Wilson. Despite their difficulties, BHP supported the efforts of Steel Cement to stick it out. The shareholders did their best to support the use of ground slag in their concrete.

What is now an everyday event in the use of slag was not so in the early 1990s as Steel Cement and ICL pioneered its use in Victoria. Over the years, the ownership structure changed with the pioneers David Noonan and Ken Willey's companies selling, and later Ube Industries. The company finally became the wholly owned subsidiary of Independent Cement, by then a 50:50 partnership between the Barro Group and Adelaide Brighton Cement.

The current success of Steel Cement is a testimony to the foresight of its founders, particularly David Noonan, the courage of its shareholders, the management and staff who have maintained the facility, and the very great work in the promotion of its output. It is now an integral part of Independent Cement and whilst it faces some interesting decisions over the next few years, its current success is just reward to all those associated with the company over the 20 years.

Capturing the Value of Iron and Steel Rock and Sand

Based on a paper by ***Gregory O; Jones D.E.*** *- "World of Iron & Steel - A construction materials perspective." - 2005 - Prepared for the Australasian Slag Association Conference Held at Radisson Hotel, Darling Harbour Friday March 18, 2005 - Note: This paper is available from the Association on Line Reference Library*

It is easy to recognise that some manufactured product has value since that is the primary focus of the manufacturing enterprise. For many organisations, it is only in more recent times that the 'offcuts', co products' or by products represent an opportunity rather than simply a disposal cost.

At a deep level this has been part of the story surrounding Iron and steel slag products. The graphic, first presented at an Association Conference in Sydney in 2005, shows the uses of iron and steelmaking slags and the development path to extracting value. For Iron furnace slag, the Romans made the discovery that casting it into blocks could form roads – a key part of the development and maintenance of the Roman Empire.

Today, the use of rock slag in roads tends to take the form of engineering designed pavements that aim at producing specific stiffness or load bearing capabilities. Modern slag pavements can be blends of different slag types along with other binders and fines to impart the required mechanical and durability properties.

Road pavements are a mid range value capture for Iron and Steel Rock and Sand.

The higher values come from granulation and grinding of blast furnace slag. Here the cementitious properties are released enabling a portion of the Portland cement used in concrete to be replaced. This has the added benefit of reducing the CO2e footprint of the structure as well as contributing to its durability.

Note: This paper is available from the Association on Line Reference Library

Source: Gregory O; Jones D.E. – "World of Iron & Steel - A construction materials perspective." – 2005 - Prepared for the Australasian Slag Association Conference Held at Radisson Hotel, Darling Harbour Friday March 18, 2005

Reference Data Sheet 2 – BF Slag Aggregates, Properties Characteristics and Applications

The second of five in the current series of data sheets being produced in the 2010-2011 period has now been published and is available for download on the ASA website http://www.asa-inc.org/reference-data-sheets.php.

This material originally formed part of a booklet, 'A guide to the use of iron blast furnace slag in cement and concrete'. Whilst still available in its original booklet form, the Association has taken the view that reviewing this material and publishing a series of datasheets makes for more economic and faster turnaround. It also ensures that each datasheet presents the latest thinking from our research and experience base. This means we can maintain current information and have it readily assessable.

Slag as Select Fill for Port Kembla Port Development

With the Inner Harbour now fully leased, the demand for additional facilities has been the trigger to accelerate proposed development in the Outer Harbour. This project will promote the future growth of trade both within the port and the wider region. While the Inner Harbour areas have potential to cater for the growth of existing cargoes, the proposed development will provide opportunities to attract new trade.

A Master Plan to guide the future development of the Outer Harbour was completed in 2008 and this has formed the basis of the project description for the Concept Plan and Major Project applications for approval under Part 3A. The Outer Harbour development would be constructed in three stages, with ultimate completion anticipated by 2037. Two approvals are being sought in parallel, a Concept Plan for the full development and a Project Approval for Stage 1 of the development. Planning approval to construct and operate Stages 2 and 3 of the Concept Plan would be subject to separate Project Applications. The Concept Plan would include dredging and reclamation to create two new terminals, one devoted to the import and export of dry bulk, break bulk and bulk liquid cargoes (multi-purpose facilities) and the other devoted to container trade (container facilities).

Regular updates on progress on this and other Port Kembla Port Sustainability projects and developments can be accessed via the Port's website or contact Trevor Brown Trevor Brown - Sustainability Coordinator - Port Kembla Port Corporation.

Image: Artists Impression of the Outer Harbour extension development using Blast Furnace Rock Slag.

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.

Australian Steel Mill Services Pty
BIS Industrial Logistics
Boral Cement Ltd
Bluescope Steel Ltd (Port Kembla)
Cement Australia
Concrite Pty Ltd
CSIRO
HiSmelt Ltd
Holcim Pty Ltd
Holcim NZ Ltd
Harsco Metal Holdings Pty Ltd
Monash University
New Zealand Steel Minerals
OneSteel Limited
Roads & Traffic Authority of NSW
SCE (Steelstone)
Steel Cement Ltd
Swinburne University of Technology
University of Newcastle
University of Queensland
University of Wollongong

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Hinczak, Dr, I (Hon.)
James, W (Hon.)
Jones, D E (Hon.)
Prosser, S D (Hon.)
Venour, M (Hon.)

Related Associations | Canadian Slag Association | National Slag Association (US) | Nippon Slag Association (Japan) | European Slag Association (EU)

Port Kembla Port Development benefits from Blast Furnace rock slag properties and availability

Tonilee Andrews – Port Engineer Port Kembla Port Corp

The Port Corporation has extensively used uncrushed blast furnace slag in the major Inner Harbour development projects we have completed over the last decade and we will again use in the Outer Harbour projects now underway. It's a great reclamation fill material as it has very good engineering properties. We have normally used BF slag that has been aged by longer term storage in open stockpiles. This eliminates the problems encountered with using fresh BF slag that can produce odours. Using aged BF slag for reclamations works in the harbour as it minimises the alkalinity of any leachate that comes from the slag and in our experience pH levels of sea water adjacent to the reclamation fill face are only slightly higher than the natural pH of sea water itself. The natural angle of repose of the face slope of BF slag pushed into the harbour as a reclamation is approximately 1.5H to 1V or about 34 degrees to the horizontal which is quite steep and an ideal slope for our harbour revetments, so trimming of the front slope is minimal prior to placing rock armoured revetments on the reclamation face to protect against wave damage. We have recently tested BF slag at the University of NSW using large shear box apparatus in order to determine the angle of internal friction (Ø) of the slag. Test results indicate a Ø of 46°. High friction angle means that the factor of safety for slope stability of the reclamation face is high and in the long term the slopes will remain secure. It also allows equipment to work close to reclamation faces during construction.

The BF slag compacts reasonably well with underwater placement due to the surcharge weight of the material itself. Deep compaction has not normally been required as the mixed grading of the material affords natural underwater compaction. Once the reclamation level is above water level the slag is then compacted in layers using vibratory pad foot rollers which breaks down the slag into smaller particles and greatly assists compaction with very high compaction levels achieved. Smooth drum rollers then seal the surface. This method produces an extremely good subgrade that actually improves its strength over time with the hydration of the cementitious components of the slag. In port construction the pavements are very heavy duty due to the very high axle loads of stockyard machinery such as fork lift trucks and reach stackers. Our pavements are designed to accommodate axle loads of 100 tonnes and more and port pavements are normally in excess of a metre thick. Typically, on a subgrade with CBR of around 10% we would have a subbase of 300mm, a bound base course of 600mm and then 150mm of asphalt. When we constructed Berth 106 a number of years ago the entire reclamation was of compacted BF slag and this produced a subgrade with a CBR>60%. Due to this high CBR we were able to completely eliminate the need for the subbase layer and the pavement was reduced from 1050mm to 775mm thick realising a considerable cost saving.

I can honestly say that the port of Port Kembla has benefited significantly over the last few decades by using BF slag in port development projects both in terms of its beneficial engineering properties but also by reducing our dependency on quarried products by reusing a by-product of the iron making process from the steelworks just over our "back fence".

Ladle Steel Slag exemption

The Association has been involved in discussion and providing test data and information aimed at bringing certainty to the conditions under which electric furnace ladle slag can be used in construction and other projects. We share a common objective with the Office of Environment and Heritage in encouraging resource recovery of materials which otherwise may have been discarded or there would be the need to justify their use on a case by case basis. Setting the expected properties and general conditions of use brings assurance to the users, producers and indeed the community allowing the material to be used appropriately.

The letter from the Office of Environment and Heritage to the Association advises:

"The Office of Environment and heritage ("OEH") is pleased to inform you of the release of the finalised Resource Recovery Exemption for electric are furnace ladle slag ("General Exemption")

The General Exemption was published in the NSW Government Gazette on 14 June 2011. A copy of the General Exemption is enclosed. This General Exemption was the result of a significant bod of work conducted with industry stakeholders and delivers certainty for industry as well as positive resource recovery outcomes and good environment protection for the community."

Members of the Association have provided a significant amount of material and testing to underpin the general exemption. They have also worked with the Associations Executive Director and OEH staff.

A copy of the generable exemption is available from the Association or from members working with electric arc furnace ladle slag products.

Specifying Sustainable Concrete - EcoCem UK

The use of Ground granulated Blast Furnace Slag as a component of Concrete mixes has been well recognised in Australasia and globally as providing durability and sustainability to structures using such mixes. **The Concrete Centre** in the UK has recently published a guidance document entitled "Specifying Sustainable Concrete". The guidance assists specifiers to optimise the sustainable credentials of concrete. It deals with the sustainability impacts on concrete of cement type, aggregates, admixtures, reinforcement and water. A key point of the report is that "The cementitious component of concrete represents the majority of the embodied CO_2 (ECO_2) of concrete".

In Irish practice, GGBS is typically used at blend rates of 30–70% with the most common being 50%. It is widely recognised that higher GGBS contents deliver:

The Concrete centre has published a downloadable guidance document to assist users and specifiers in achieving the most sustainable concrete having in mind the environment in which they are working.

Calculate CO_2 Savings

CO_2 savings arise because Ecocem GGBS has a CO_2 footprint of 0–50 kg/tonne and replaces ordinary cement, CEM II/A or CEM I, which has a CO_2 footprint of approximately 800–900 kg/tonne respectively. If 50% Ecocem cement is used in a typical 8m3 concrete delivery, a saving of 1.0 tonne of CO_2 will be achieved.

In Australia there have been many structures where GGBFS has been used to impart durability, including the Sydney Harbour Tunnel immersed tube segments, the seawall around the Sydney Opera House and as undersea grouting for components of the Offshore Gas platforms on the North West shelf of Western Australia. As well as the durability against the aggressive environments, there is also the lowering of the structures CO_2e footprint.

Revised credit will drive demand for environmentally responsible concrete

A revised Green Star 'Concrete' credit, which aims to further drive demand for concrete with reduced environmental impact, has been released for stakeholder comment. This revision is based on the work of a concrete expert working panel and comes out of a 20 month review of independent research and a site tour of Australian Cement manufacturing facilities.

A Concrete Credit to encourage the use of supplementary cementitious materials (SCM) and recycled aggregate in concrete has been in place since the Green Building Council of Australia introduced Green Star in 2003 says Green Star Director, Andrew Aitken.

"The Concrete Expert Reference Panel determined that the broad focus of the previous credit was appropriate, but that it could be clarified, as well as improved through the introduction of new criteria to encourage the use of alternative fuels in cement kilns, alternative fine aggregate and non-potable water in concrete."

The revised Concrete credit has also been streamlined through the introduction of templates and a reference case for SCM use.

"The global cement industry is working to reduce its environmental impact, and is developing more sustainable and cost-effective production methods. Use of SCM, alternative fuels, non-potable water and non-virgin aggregate in cement production are key strategies for achieving this aim," Mr Aitken says.

"The review of the Concrete credit reflects the GBCA's commitment to ensure Green Star tools remain relevant, robust and at the leading edge of best practice," Mr Aitken concludes.

Source: Green Building Council of Australia

AUSTRALASIAN

The New Zealand Concrete Society is holding its 9th International Symposium on High Performance Concrete Design, Verification and Utilisation in Rotarua New Zealand. For conference details contact the Societies website at http://www.hpc-2011.com

Concrete Institute of Australia - 25th Biennial Conference, Concrete 2011 - 12-14 October 2011 at the fabulous Burswood Entertainment Complex, Perth. The Institute is pleased to inform Members that the registration brochure for the Concrete Institute of Australia's 25th Biennial Conference, Concrete 2011, is now available. The conference will be held from 12-14 October 2011 at the fabulous Burswood Entertainment Complex, Perth, Western Australia. Members can download a copy of the brochure from both the Institute's homepage www.concreteinstitute.com.au or from the Conference website www.concrete2011.com.au.

Executive Director attends NSA – During May, ASA Executive Director Craig Heidrich attended and made a presentation to the National Slag Association meeting in the USA. There is a long standing relationship between the two Associations. The ASA formed in 1990 based its original structures and constitution on the National Slag Association formed in 1918. Members from both Associations have addressed meetings and conferences, sharing information and expertise.

World of Iron and Steel Slag – International collaboration between National Associations on slag product usage remains a high priority. During the Global Slag Conference in Sydney in November 2010 an initial meeting and teleconference was held to test the interest of the other Associations in maintaining this regular contact and information sharing.

INTERNATIONAL

The 7th **Global Slag Conference** returns to the Northern Hemisphere. This year it will be held in Scandinavia for the first time in Helsinki Finland. Dates for your diary 17-18 November. Further details are available through the Global Slag website at www.propubs.com/gsc

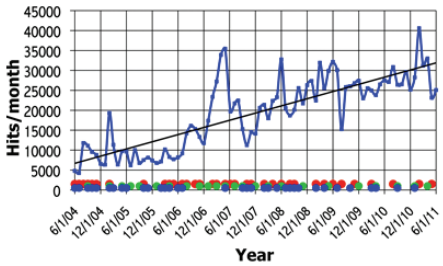
Website Revision and the first issue of our E News - Connections combine to increase traffic on the Associations Website

Alison Fitzgerald

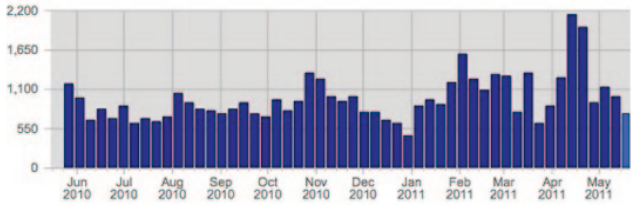
The new ASA website has proven very popular among members and the general public. This is evident through the increased hits and downloads it has received since the websites revamp and launch date (7th April, 2011). The graph below shows a noticeable increase in website hits since April, which is positive feedback for the ASA and it's members.

Furthermore, since the new website was developed the downloading of Connections has significantly increased. In the graph below it shows a large spike in downloads from the 7th April, in which the website was launched as well as the April edition of connections being published. Additionally, for the months of March and April, 325 searches on the library database were registered.

Current and future issues of Connections will be electronic with the capacity to download back issues from the Associations website. Additionally, new content will be added progressively to the website including the current and developing datasheets.



Above: Monthly website hits over a 12 month period



Above: Weekly document downloads from library over a 12 month period