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07

ASSOCIATION connections

AUSTRALASIAN SLAG (IRON & STEEL) ASSOCIATION NEWSLETTER

www.asa-inc.org.au

THE CLIMATE IS RIGHT

SUDDENLY IT SEEMS THAT AUSTRALIA has been awakened to the potential reality of global warming. It was poet Dorothea Mackellar who years ago described this country as a "land of droughts and flooding rains". With much of the country in drought and major cities realising the finiteness of their water supplies, the impact of our environmental footprint has, as some would say, finally become front page news. Now Australian Governments are beginning to speak about alternate energy, emissions trading schemes and other abatement measures.

The latest shockwave in our more recent discovery of environmental impact comes from the NSW Land and Environment Court. In assessing a proposal for development of the Anvill Hill coal mine in the Hunter Valley, the Court has ruled that the downstream environmental impacts locally and globally should be considered in the environmental assessment process (Marcus Priest – Australian Financial Review p3 28/11/06 – 'Emissions ruling hits coalmine'). No doubt this ruling and its implications will exercise the minds of Governments, regulators and industry and in this case could delay the mine's opening.

Over many years since its incorporation, the Australasian (iron & steel) Slag Association has been drawing to the attention of Governments, regulators and those in the construction industry the versatility and benefits of using slag products. The use of some 500,000 tonnes annually of ground granulated slag in cementitious applications contributes just under 500,000 tonnes of greenhouse reduction credits to the national economy. This is in addition to the technical and potential durability benefits that flow from the material's use.

The Association remains active in its endeavours to promote the environmental and technical benefits of using products of iron and steel slag in construction. To this end, it is staging its second conference next year on the subject of sustainability. Association members have just returned from participating in the Global Slag conference where Executive Director Craig Heidrich presented a paper on "GGBFS lowering Australia's greenhouse gas emissions profile". It is expected that members will also respond to the Euroslag Board's invitation to participate in the 5th European Slag Conference for 19-21 September 2007 in Luxembourg. @

PLAN NOW FOR ASA'S 2007 CONFERENCE
SUSTAINABILITY, CONSTRUCTION MATERIALS AND YOUR BOTTOM LINE

→ TO REGISTER: VISIT WWW.ASA-INC.ORG.AU AND CLICK ON THE LINK TO THE CONFERENCE SITE.

FOLLOWING THE SUCCESS of the Australasian (iron & steel) Slag Association's inaugural Conference in 2005, the ASA has decided to make this a biennial event, with the next Conference scheduled for May 4th 2007.

The previous conference attracted an extremely diverse audience, all of who shared an interest in exploring, discussing and learning about the benefits arising from the utilisation of iron and steel slags. Sector participants included: construction, engineering design, material suppliers, regulators and local government.

Our 2007 organising committee is well advanced in its plans, and has put in place the people and facilities to make this a must for people in the construction industry, designers and specifiers as well as key people from industry and Government.

Conference themes will cover a wide range of topics, with guest speakers addressing the issue of sustainability and the use of iron and steel slag materials in the construction sector.

Topics will include:

- Sustainability in the Construction Chain
- Sustainability and the Bottom Line
- The Business Case for Slag

A key objective of the conference will be to communicate and exchange ideas on research and development activities over the past 2 years. Secondly, to disseminate information to a broader audience of people involved in the construction industry, including: designers, engineers, specifiers, educators, local, state and federal government policy and those interested in durability of structure, greenhouse gas reduction and resource conservation. The Conference venue is the Shangri-La Hotel in the Rocks area of Sydney. @

THIS ISSUE

CONNECTIONS EDITORIAL TEAM

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ECOCEM NOTCHES UP 500,000 TONNE OF GREENHOUSE GAS REDUCTIONS

ECOCEM IS LOOKING FORWARD to reaching a significant milestone in its short time supplying the concrete and associated markets with its slag binder. "We are very proud to have contributed to the growth of Ecocem" said Shani Smith and Robert Cignarella, responsible for the marketing efforts of the company.

Five hundred thousand tonnes is a great effort, considering the plant at Port Kembla did not even exist six years ago. This is a phenomenal amount of CO_2 not produced or released into the atmosphere!

"Apart from the obvious benefits to the plastic and hardened properties of concrete, I also try to influence architects and engineers by talking about sustainability and the benefits to the environment", Robert said. "I often mention the fact that if we replace up to 35% of the cementitious content of the concrete mix in the construction of an average four bedroom home, we can save up to 14 tonnes of CO_2 entering the atmosphere.

This does not really mean much to them until I tell them it's the equivalent of driving your car for 15,000km per annum for 4.7 years, or powering your home for 1.6 years. This is when they take note" Robert said.

Ecocem has also released a new brochure which is less technical and more "green" and has proven popular with both architects and engineers.

[Source: Ecocem Australia: www.ecocem.com.au]

"FIVE HUNDRED THOUSAND TONNES IS A GREAT EFFORT, CONSIDERING THE PLANT AT PORT KEMBLA DID NOT EVEN EXIST SIX YEARS AGO"

AUSTRALIAN DELEGATION TO THE GLOBAL SLAG CONFERENCE AND EXHIBITION

THE SECOND GLOBAL SLAG CONFERENCE and Exhibition themed - 'Slag in Asia: the profit iceberg' was held at the Royal Orchid Sheraton Hotel Bangkok, Thailand from 20-21 November 2006.

Association Executive Director Craig Heidrich attended the conference and presented a paper "GGBFS lowering Australia's greenhouse gas emissions profile" Other Association members in attendence were Rob Newman, SCE Group; Paul Gear, AMR; James Young, SCE Group and Ross Johnson, Consultant.

Main themes were: Global slag production: markets and buyers, Opportunities for profits in Asia, Emissions trading, Chemical and mineralogical optimization 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.

Executive, Craig Heidrich

A report from members who attended the Global Slag Conference will be provided in the next issue of Connections

Further information: www.globalslag.com

GGBFS LOWERING AUSTRALIA'S GREENHOUSE GAS EMISSIONS PROFILE

UNDER THE KYOTO ACCOUNTING RULES, Australia's National Greenhouse Gas Inventory report emissions for 2004 totaled 564 Mt carbon dioxide equivalent (CO_2-e) being a net increase of 2.3% on the 1990 level. This increase is largely attributed to the stationary energy, transport and industrial process sectors, offset with significant reductions from reduced land clearing.

For the construction sector additional mitigation strategies could be employed to further reduce Australia's net CO_2-e emissions. For example through increased use of mineral resources like coal combustion products such as- fly ash, granulated iron blast furnace slag and amorphous silica, all of which are commonly referred to as supplementary cementitious materials (SCM's), used with Portland cement in the manufacture of concrete. For Australia, the manufacture and delivery of one tonne of cement results in the emission of approximately 0.82 tonne

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STEELSTONE: MAKING A DIFFERENCE ON THE FIVE ISLANDS PROJECT

Image: www.rootzone.com.au

THE FIVE ISLANDS ROAD UPGRADE, currently under construction by Thiess – is a $30 million dollar project involving the upgrading of 1.7kms of Five Islands Road between the roundabout at Speer Point (northern end) and the roundabout at Booragul (southern end) on the north western edge of Lake Macquarie, south of Newcastle. The upgrade will provide a welcome relief to the 32,000 vehicles that utilise the road each day.

In total, approximately 20,000 tonnes of Steelstone's 'Mix 3' heavily bound road base will have been supplied to the project by completion in 2007. The scope of works includes widening to a four-lane divided road with two new bridge crossings over Cockle Creek. This will significantly reduce traffic congestion along Five Islands Road.

Steelstone's Mix 3 was selected by Thiess for use on this project because of its superior performance due to a number of critical traffic switches through construction: a material that performed well under early traffic loading was essential. The superior elastic modulus of Mix 3, non plasticity and relative moisture insensitivity made Mix 3 ideal for the application, especially where early traffic-ability was required. The ease of placement of Mix 3 due to consistent grading and workability, allowed the pavement to be placed and compaction achieved with a minimum of effort avoiding costly delays.

Steelstone's' performance as a flexible pavement in the early stages of strength development is superior to any other product currently conforming to RN73. The "self cementing" properties of a slag based pavement made the selection of a Steelstone's Mix 3 even more relevant due to the number of construction joints that would be formed as a result of multiple pavement sections over the length and width of the pavement, resulting in a strong, homogenous bound pavement.

Steelstone's unique blend of granulated blast furnace and steel slags known as 'Mix 3' was developed in conjunction with the Hunter Branch of the RTA and has been used successfully in major projects throughout the Hunter Valley and Central Coast Regions for over 15 years. Mix 3 fully conforms to RTA Specification RN73 "Slag Based Bound Pavement" and is supplied from Steelstone's Operations on the former BHP Site in Mayfield, Newcastle.

Steelstone's Mayfield operation is ideally located for the supply of slag based heavily bound pavement materials to the Newcastle, Hunter Valley and Central Coast regions.

Slag Pavements will increase in strength over a much longer time. Standard 28 day UCS results or seven day accelerated UCS results indicate that slag pavements are approximately 4 — 6MPA. However, long term strengths from core samples have been recorded and are commonly found in the order of 7 — 10MPA.

(Source: SCE Steelstone Newcastle)

THE NEW ROUSE HILL TAKES SHAPE

Artist Impression of the Complex

THE ROUSE HILL REGIONAL CENTRE is a community where sustainability has been a priority in the selection of the materials used in the construction of this significant infrastructure project taking shape in the North West of Sydney.

This sustainable community will be home to 4500 people. It will boast over 31 hectares of useable green space with a true town centre at its heart.

The town centre at the New Rouse Hill will incorporate approximately 100 residential apartments, as well as social and community infrastructure, including a new state of the art library. In addition, $470 million is being spent building a vibrant retail, entertainment and commercial "Town Centre".

Boral Concrete has been fortunate to have secured the supply of concrete to this project. David Hocking, Technical Manager, said "We have worked closely with Bovis Lend Lease to ensure we could contribute to the theme of sustainable urban community development. Apart from the obvious attributes slag aggregates offer to concrete in hardened properties, we pushed the use of these based on economic and sustainable benefits. Completion of this project will see the effective utilisation of over 20,000 tonnes of slag aggregates for special class post tensioned mixes, supplied by Boral Concrete Blacktown, Windsor, and Concrite Blacktown.

(Source ASMS Port Kembla)

"THIS SUSTAINABLE COMMUNITY WILL BE HOME TO 4500 PEOPLE"

membership

Company Members

A primary role of our Association is to bring together Slag Producers, Processors, Customers and 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, just complete the information section at the end of this newsletter. Current membership is as listed below.

Australian Steel Mill Services Pty
BlueScope Steel Ltd (Port Kembla)
Brambles Equipment Ltd
Brambles Industrial Services Ltd (Whyalla)
Concrite Pty Ltd
CSIRO CMIT
EcoCem Pty Ltd
Fractum ApS
HiSmelt Ltd
Holcim NZ Ltd
Hunter Mill Services Pty Ltd
Komatsu Australia Ltd
MultiServ Australasia Pty Ltd
MultiServ (UK)
OneSteel Limited (Whyalla)
University of Newcastle
University of Wollongong
Premium Tyre Service Pty Ltd
Readymix Holdings Pty Ltd
Roads & Traffic Authority of NSW
Slag Cement Sdn Bhd (Malaysia)
Smorgon Steel Ltd (Melbourne)
Smorgon Steel Ltd (Newcastle)
Steel Cement Ltd
SteelServ Ltd (NZ)
Steelstone Services
Sunstate Cement Ltd
Wormald Fire Systems Ltd

Personal Members

Anderson, L
Dobson, G
Gregory, G
Hanley, P (Hon.)
Hinczak, Dr, I (Hon)
James, W (Hon.)
Jones, D E (Hon.)
Heaton, B (Hon.)
Maric, M
Prosser, S D (Hon.)
Venour, M (Hon)Hon

Related Associations

National Slag Association (US)
Nippon Slag Association (Japan)
European Slag Association (EU)

LOW-COST WALL PANELS FROM BLAST FURNACE SLAG CEMENT IN BRAZIL

IN BRAZIL, AS IN MOST OF LATIN AMERICA, increased costs for building materials — especially Portland cement — have compounded a housing crisis affecting the country's low-income population. In the search for alternative low-cost building materials, researchers have investigated the use of industrial and agricultural wastes.

Slag is a good example of one such industrial waste that is abundant in Brazil. A by-product of the country's steel industry, slag is produced by purifying iron ore into pig iron, and sits in huge mounds outside iron furnaces. Brazil produces some three million tonnes of blast furnace slag (BFS) per year, and its disposal is a problem. Once broken down, the slag is called granulated blast furnace slag (GBFS).

With IDRC support, engineers of the Instituto de Pesquisas Tecnologicasdo Estado de São Paulo S.A. (IPT) at the University of São Paulo have designed and manufactured hollow wall panels and constructed a prototype house. The IPT-IDRC Composite Precast Panel

System is a low-cost, environmentally sensitive technology. It uses GBFS-based cement reinforced with coir fibres instead of traditional steel rebar. Taken from the outerhusk of the coconut, the stiff, coarse coir fibres are widely available in Brazil and other Latin American countries. Since common Portland cement tends to destroy vegetable fibres, the IPT-IDRC composite is the first to combine low alkaline water-resistant cement with coir fibres, resulting in a durable building material.

Producing GBFS-based cement does not require burning, resulting in 70% less energy consumption compared to the amount

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of CO_2-e or 6.5 Mt of CO_2-e emitted for total cement sales in 2003.

This paper discusses energy and resultant emissions data collected from companies processing selected SCM's, life-cycle analyses were conducted to demonstrate the reduced embodied energy and resultant CO_2-e signature for one cubic meter of concrete containing various combinations binders. From the resultant data and analysis, a simple CO_2-e estimator has been developed to assist architects, designers and consulting engineers to specify eco-friendly structures.

For the construction of a domestic dwelling (a four bedroom home) using approximately 130 cubic metres (m^3) of 25 MPa concrete containing binder ratios of 35% Portland cement and 65% ground granulated blast furnace slag cement, the total savings in CO_2-e emissions was 17.03 tonnes, which is equivalent to emissions from a four-cylinder car for 5.68 years.

The paper briefly discusses Australia's current National Greenhouse Gas Inventory Report in the context of how increased use of SCM's in the construction sector can further lower greenhouse gas emissions, whilst still delivering improved durability performance.

[1]HBM Group Pty Ltd, PO BOX 1194, Wollongong, NSW 2500, Australia
[2]Cementech Pty Ltd PO BOX 362, Liverpool NSW 2170
[3]Energy Supply Association of Australia, GPO Box 1823Q Melbourne Vic 3001

necessary to produce Portland cement. The cost of a wall panel plant is thereby reduced since no rotary kiln is needed. This means that smaller, more efficient plants can become economically viable. The cement itself is composed of GBFS (92%), hydrated lime (2%), and gypsum (6%). The mix proportions are, by weight, 1:1.5:0.51(cement, sand, water), reinforced with a volume of 2% coir fibres, averaging 30mm long. Mixing is done in an ordinary concrete mixer.

Designed to be easily produced onsite or in a small plant, the 40 cm wide and 250 cm high IPT-IDRC wall panels weigh less than 120 kg, and can be assembled without any heavy or expensive equipment. Since steel rebar is not used as reinforcement, there is no risk of corrosion in the panel. A complete performance evaluation was developed and performed, and the panels comply with IPT standards, meaning that their expected performance will be equivalent to an ordinary hollow brick wall.

To test the panels under real conditions, a 24 square metre prototype building was constructed in 1989 on a São Paulo street. The external and internal walls were finished with commercially available emulsion paint. After eight years, there is no visible degradation on the external walls. A detailed investigation of the degradation of the fibres and cement is being performed. First results confirm that no alkaline degradation and no bio-deterioration occurs with the fibres.

[Source: Dr. Vanderley M. John – Divisao de Edificacoes Instituto de Pesquisas Tecnologicas do Estado de São Paulo S.A.(IPT)] Cidade Universitaria 05508 São Paulo Email: VMJohn@pcc.usp.br Website: www.ipt.br

THE 5TH EUROPEAN SLAG CONFERENCE – INVITING AUSTRALASIAN PARTICIPATION

The board of EUROSLAG has decided to plan the 5th European Slag Conference for 19-21 September, 2007 in Luxembourg.

The Conference will include reports from the main steel producing countries in the world. We would be very appreciative if an Australian representative would provide us with a report about the "slag situation" in your country and/or about the results of the research work you sent us. A call for papers for the Conference was sent out in May and is available through the ASA Office or:

details of the conference will be published in due time on the EUROSLAG website www.euroslag.com

SLAG – "THE ULTIMATE RENEWABLE MINERAL RESOURCE"

The video has proved to be very useful to many members. New additional footage has been incorporated demonstrating the beneficial properties of slag in various large-scale projects completed in recent years. The video (15 minutes duration) outlines slag's historical beginnings through to the various types of slag produced in a modern production process today.

Copies are available to members at a cost of $15.00 each and to non-members $20.00 plus postage and handling.

CD TECHNICAL RESOURCES

ASA produces a number of high quality technical guides (i.e. the new – "A Guide to the use of Iron and Steel Slag in Roads" and the "Guide to the Use of Steel Furnace Slag in Asphalt and Thin Bituminous Surfacings") bulletins, newsletters and general industry information on current issues. The Education and Promotion Committee has developed a Technical Compendium on CD; an invaluable readily accessible reference tool for engineers, specifiers, consultants, government authorities, and slag users: *A limited number of hard copies are also available.* Copies are available to members at a cost of $15.00 each, non members $20.00 — plus postage and handling. Updated CD's will be available for registered users as new material is added.

AUSTRALASIA NEWS

ASA RESEARCH REPORT ON SLAG USE FOR WASTEWATER IMPROVEMENT

The Australasian Slag Association Inc (ASA) engaged Landcare Research to study the performance of slag in removing stormwater contaminants. Impervious surfaces are a major contributor to urban stormwater impacts. Stormwater has been identified as a major contributor to water quality degradation as it can have significant concentrations of harmful pollutants that can adversely affect the receiving aquatic environment. Materials that can remove harmful pollutants and can be incorporated into stormwater treatment devices offer part of the urban stormwater solution. This project tests filter material designed to remove contaminants while maintaining hydraulic performance and provide data on the potential environmental effects and the effectiveness of different iron and steel slags produced in New Zealand and Australia for remediation of stormwater pollution.

The report is available on ASA's website at: ASA-inc.org.au/doc/ASA_Landcare_Report.pdf

NSW LAND AND ENVIRONMENT COURT CONSIDERS FUTURE GREENHOUSE EMISSIONS FOR COAL MINE APPROVAL

"Court: emissions from burning coal should be part of mine assessment

In a landmark ruling, a NSW court has held an environmental assessment for a proposed major coal mine submitted to the state's Dept of Planning was inadequate because it didn't take account of the greenhouse gas emissions from burning the coal.

However, Justice Nicola Pain of the NSW Land and Environment Court declined to order that the assessment be revamped and re-released for comment. "

Extract from Thompson Environmental Manager November 28th 2006

ANOTHER SUCCESS FOR SLAG ROAD BASES

Based on the excellent previous performance of slag products at the North Kiama Bypass project, Roads and Traffic Authority have nominated the same slag products in future projects such as Northern Distributor extension from Bellambi to Bulli and the Oak Flats Interchange to Dunmore.

(Source ASMS – ViJay Joshi)

MULTISERV, VICTORIA: NEW APPOINTMENT

NEIL DUNBAR has joined MultiServ at the Smorgon Steel site in Laverton North. He comes from the Aggregate and Asphalt Industries, having worked with the Readymix and Emoleum organisations for some years. His experience is with the assessment of primary resources for quarry development, crushing and screening, materials testing, and research and development in silica mining and hard rock quarry products.

Neil has quarry management experience and has managed a Nata registered materials testing laboratory in Western Australia. He moved to Victoria with his family two years ago as a project manager with Emoleum. He and his wife have four children, two who live in Perth and two more who live at home.

INTERNATIONAL

STEEL SLAG PAVES I-74 IN SOUTHERN INDIANA

(MultiServ, Gallatin, KY)—

O'Meara Construction was the successful low bidder for the repaving of I-74 in southern Indiana using steel slag supplied by MultiServ from their Gallatin, KY facility. The US6.2 million project requires 45,000 tonnes of asphalt aggregates for the pavement mixture, having a mixture of 85% steel slag aggregate and 15% natural aggregates. Steel slag is specified for the $1^{1/2}$" overlay, paving 20 miles of the north and south bound lanes of the interstate roadway.

(Source: NSA Slag Runner August 2006 No. 3-06 http://www.nationalslagassoc.org/)