Rise in International Attendance

Tecnargilla 2012 (September 24–28, Rimini, Italy), organised by Rimini Fiera and Acimac, has set a new record in terms of international visitor figures. International attendance totalled 14,822 – 1.5 % up on the already excellent results of 2010. This outstanding figure underscored growth in the show's international profile, the highest of any of the exhibitions held in the Rimini exhibition centre. 48.6 % of the visitors converging on the Rimini exhibition centre came from 110 different countries worldwide, uniformly distributed across all continents.

"These figures once again demonstrate that customers are interested in the best and most innovative technologies that are making their international debut at Tecnargilla," said Acimac's chairman, **Fabio Tarozzi**. "At the exhibition our companies displayed a wide range of technological innovations that were well received by customers."

"Another important factor is the high profile of visitors", he added. "At the fair we received visits from the top managements of the world's leading producers of ceramic tiles, sanitaryware, tableware and heavy clay products."

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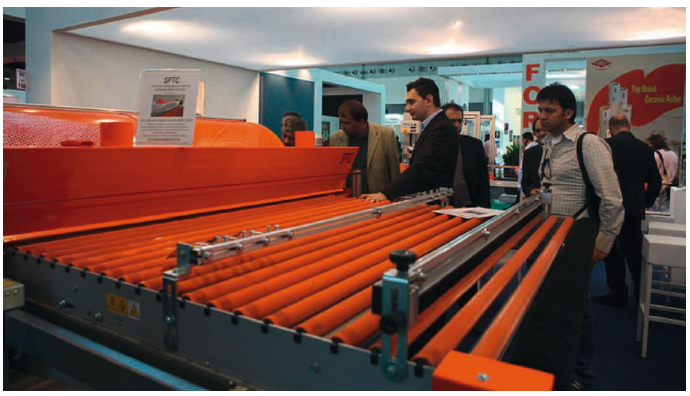

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"Given the presence of large numbers of high-quality buyers, most exhibitors were able to establish a greater number of contacts than at the last few editions of the show – an important indicator for order intake projections over the next few months."

The show was also strongly attended by Italian buyers. During the five days of the event, Tecnargilla was visited by 15,466 Italian professionals (51.4 % of the total).

For more information contact: Gian Paolo Crasta, Tecnargilla Press Office Manager, phone: +39 33 46 64 95 34, g.crasta@tecnargilla.it, www.tecnargilla.it

Stoke-on-Trent: Ceramics Made in the UK

D. Jarvis*

Ceramics production was first recorded in Staffordshire (UK) as far back as 1200 but it was only relatively recently that it flourished. For close on the last three hundred years the area of North Staffordshire in the English midlands has been a well known and respected centre of the ceramics industry in the UK. This area of England was well endowed with a range of clays, coal and a transport infrastructure which started with coaching roads and canals and now encompasses ocean container loading facilities and airfreight distribution channels. Originally the raw materials which were found close to the surface were excavated by artisans even from local unpaved roads thus giving rise to the term "potholes" which we still encounter today but for different reasons.

History of "The Potteries"

The area has been known worldwide for many years as "The Potteries" and claims to be "the world's largest and most famous pottery producing city". The city now named Stoke-on-Trent was officially born on the 31st March 1910, with the federation of the six towns in the area. The legacy of this union lives on undiminished, as locals and citizens of the UK generally will almost always refer to "The Potteries", meaning the various towns in the area collectively, rather than the official title of "The City of Stoke-on-Trent".

At its peak the ceramic industry in the area employed about 100,000 people in over 200 separate factories with more than 4,000 of the distinctive bottle shaped kilns in operation. The environmental impact and the quality of life can only be guessed at.

Family companies such as Wedgewood, Spode, Minton and others were in full operation in the middle of the eighteenth century and are names which are still recognised today along with many others such as Royal Doulton, Portmeirion, Moorcroft and several important newer producers such as Steelite, Dudson Churchill and Bridgewater.

In the 21st Century it is a vastly different situation where the industry directly employs about 8,000 people in more than 30 companies although a great many others are still employed in order to service this regional core industry.

In the intervening period since the industry was first established many of the early companies have been taken over, merged or simply gone out of business. Although there was a substantial amount of money invested the industry encountered serious major problems. The markets became globalised with competition from many new sources driving down prices and profit margins.

In the seventies environmental legislation added substantial costs in meeting the requirements of the clean air act and other social costs such as health insurance and pensions. Since about 60 % of the costs were in labour many companies tried to outsource work to low labour cost countries. Due to additional costs in quality assurance and control and the extended supply chains it was found however that well funded and managed companies could still not only compete but thrive locally. One example of this is in the Steelite company which employs about 700 people exporting about 80 % of its production of table top wares to the hospitality industry in over 125 countries around the world.

Seminar and exhibition

For the fourth year in succession an international seminar and exhibition has been staged by local organisations and businesses on **October 25**. This year's event **"A New Ceramics 2012 – A Sustainable Future"** has been sponsored by Stoke-on-Trent City Council, and supported by North Staffordshire Chamber of commerce, the British Ceramic Federation, Dudson, Endeka Ceramics and Ceram Research. The event which is partly funded through the European Regional Development Fund attracted over 400 delegates to hear the six speakers along with more than 50 industry sponsors and exhibitors. It was a collection of local companies with a global reach and an indication how a mature industry can hold its own with the new materials of the 21st century.
The seminar was held in the Sir Stanley Mathews Suite of the Jubilee Stadium home to Stoke City Football club.
The first presentation was "The Ceramic 2050 Road Map" by **Laura Cohen**, Chief Executive of the British Ceramic Federation, which was followed by "Industry and Academia Working Together" by **Professor Julie Yeomans,** University of Surrey, and "Sustainable Manufacturing in the UK" by **Nick Hill** of Marks and Spencer. After a coffee break papers on "An Iconic vision for UK branded Ceramics" was presented by **Karin Beale Philips** and "What Made in the UK Means to a Global market" by **Jo Cooper**. The final session was a lively debate on the topics presented.

* David Jarvis, Industry Consultant.
E-Mail: dajarvis@btopenworld.com

Perfect Premiere in Duesseldorf

Exhibitor numbers up 10 %, exhibition surface up 20 % and a visitor plus of 23 %: for **ALUMINIUM (October 09–11, 2012**), which was held in **Duesseldorf (Germany),** for the first time after its move from the Ruhr to the Rhine, it was the perfect premiere. With 961 exhibitors from 51 countries (previous event: 872 from 47 countries) and 21,300 visitors (17,200) the trade fair of the aluminium industry emphasized its position as one of the most successful industry fairs. The move from Essen (Germany) where ALUMINIUM had been held since 1997, occupying 65,000 m² at the last event, had become necessary to meet the current need for exhibition space of 78,000 m². "With the move to Duesseldorf and the associated increase in international participation, ALUMINIUM has completed its entry into the first league of industry fairs", says **Hans-Joachim**

Erbel, CEO of the organiser Reed Exhibitions. 60 % of the exhibitors and more than half of the visitors came from abroad; one third of international visitors came from countries outside Europe – a mark of excellence which demonstrates that the reach and relevance of ALUMINIUM continue to increase further.

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The increased internationality also proved attractive for the entire industry. In Germany, the **Gesamtverband der Aluminiumindustrie (GDA)** (Association for the Aluminium Industry) expects the current financial year as a whole to remain almost stable, despite a slight drop in production in the first half. There are strong impulses for growth coming from countries and regions outside Europe. The increase in the number of visitors from these regions was particularly pronounced at this year's ALUMINIUM. This market situation is also reflected in the business index which is compiled by a market research organisation in connection with ALUMINIUM. According to this survey more than 54 % of the companies expect significant increases in the mid-term. The next ALUMINIUM will take place from **October 7–9, 2014 again in Düsseldorf.**

For more information: Dr. Mike Seidensticker, Press Office, Reed Exhibitions, phone: +49 (0) 21 19 01 91-2 21, presse@aluminium-messe.com, www.aluminium-messe.com

7th Meeting of Producers and Users of Refractories of the Brazilian Association of Ceramics (ABCeram)

*R. Salomão

Focus on refractories for cement and lime industries

The 7th Meeting of Producers and Users of Refractories (7th ERUR) of the Brazilian Association of Ceramics (ABCeram) was held from **October 17th to 19th in Curitiba**, capital city of the brazilian state of Paraná, with the theme "Refractories for Cement and Lime Industry". Oven 120 delegates attended the 12 presentations, a round table debate and a visit to the Votorantim Cimentos facilities.

The ERUR is a biannual basis event that gathers most of the refractories community in Brazil and also presents an expressive foreign participation (mainly from South America, USA, Western Europe and China). Topics vary according with the technological and economic trends and in past editions versed about steelmaking (2010 and 2003), iron ore reduction (2008 and 2002), thermal insulation and oil and petrochemical industries (2006) and national and international trends (2000). This 7th edition was sponsored by the Refractories Division of the Brazilian Association of Ceramics (ABCeram) and the companies Refrasa, Skamol, Alfran Brasil, Insertec Dedini, Elfusa, Global Heat Transfer, Thermojet, SER (Treibacher Schleifmittel, Almatis, Armil and Cerâmica Porto Ferreira also supported ABCeram).

The event was chaired by **Ulisses Prado** of IBAR and the co-program was coordinated by **Rafael Salomão** of University of São Paulo (USP), **Adilson Chinelatto** and **Lucas Alves** both of State University of Ponta Grossa (UEPG). The participants and speakers were from Brazil (mostly), Argentina, Chile, Peru, USA and Norway, being mostly industry people, but also researchers, academics and undergraduate students.

Technical program

During the opening ceremony, the key-note speaker **Álvaro Lorenz**, Votorantim Cimentos, presented a review about the over 100 years old "Cement Industry in Brazil". Amongst the data presented, Brazilian cement industry was pointed out as one of the most efficient regarding the thermal consumption per ton of clinker produced (around 870 Kcal/Kg clinker), the use of alternative fuels (spent tires, recycled plastics and biomass), pozzolanic and slag additions (up to 48 % in some cases) and CO_2 emission (576 Kg CO_2 / ton cement versus 631 Kg CO_2 / ton cement worldwide). With 80 producing unities, Brazil consumed 64.2 million tons of cement in 2012 (over 98 % produced domestically).

Auditorium of ERUR 2012

The second day of the event was opened by **Ulisses do Prado** from IBAR with the presentation "A Retrospective on Refractories for Cement Kilns" and this was followed by **Marco Rodrigues** and **Luis Arruda** from FLSmidth speaking about "Technology and Innovations for Cement and Pyro Metallurgy Industry". Following, **Waldir Resende** from IBAR presented recent findings in "Refractory Castables for Cement and Lime: Evolution, Properties and Placing Methods" and **Eliane Taveira**, Brick Solutions/3L&T, spoke about "Maintenance Cycle for Refractories". After lunch, **Mauro Seabra** from Brazilian Association of Lime Producers (ABPC) talked about "Social Responsibility on The Lime Sector", presenting important data about the 8.5 million tons lime production in Brazil in 2012, such as main consuming markets (civil construction and steel making with over 60 % of the total consumption) and the several actions performed by the ABPC to improve quality, safeness and the reduction of CO_2 emissions. This was followed by **Edson Deviti** from Insertec Dedini and **Rodolfo Santeli** from Alfran presenting "Novel Refractory Technologies for Cement and Lime Industry". **Odenir**

Moreira from Thermojet spoke about "New Technologies in Thermal Solutions for Cement and Lime Factories". **Luís Cláudio Palhares** from Protermq presented "Metallic Anchoring: Project, Application, Importance and Post-Morten Analysis" discussing the key-role of the metallic anchoring on refractory linings.
The third day started with **Marcelo Pecchio**, Brazilian Association of Portland Cement (ABCP), and his presentation "The Brazilian Cement Industry and Its Actions Toward Sustainability". **Christian Bach**, Skamol, spoke about "Enery Saving in Rotary Kilns: Projects and Improvements", presenting some cases where the investment in thermal insulation on rotary kilns led to significant energy loss reduction. In the sequence, a round table with **Robson Liz**, Reframax, **Eliane Taveira** and **Antonio Astudillo** of Alfran, **Jeferson Pedroso**, Votorantim Cimentos, **Víbio Andrade**, SER Construtora, and **Dair Fávaro**, Cimentos Itambé, discussed "Alternatives for Increase Production and Reduce Refractories Maintenance Idle Time".
After lunch, **Taner Augusto Maia**, from Togni Refratários, presented an interesting case study on "Lime Kiln Refractories: An Alternative Proposal to The Conventional Preshaped 70 % Al_2O_3 Materials". Finally, **Márcio Geraldo de Oliveira,** Magnesita Refratários S.A. spoke about "Basic Refractories: State-of-art and Innovation".

About ABCerm

ABCeram was founded in 1953 as a civil non-profit organization in the city of São Paulo with the mission of facilitating interaction among ceramics professionals by means of regular meetings, fairs, training courses, scientific and technical national-international exchange, and promoting development and innovation in the field. Besides "The Meeting of Producers and Users of Refractories", ABCeram also hosts "The Brazilian Congress on Ceramics", "The Meeting of Miners and Consumers" and "The Latin American Conference on Powder Technology". ABCeram is responsible for five main publications. The oldest one is the journal "Cerâmica", which has been continuously published since 1955, reaching its 348th issue at the end of 2012. "Cerâmica Industrial and Materials Research" (published in English), a newsletter and the "Brazilian Yearbook of Ceramics" are additionally published by ABCeram. These are open access magazines that can be found in the free-access electronic data base "SciELO" (Scientific Electronic Library Online).

* Prof. Dr. Rafael Salomão, Universidade de São Paulo (EESC/SMM), Av. Trabalhador Sãocarlense, 400 13566-590, São Carlos – SP, Brazil. E-Mail: rsalomao@sc.usp.br

Seminar on Refractories for CFBC Boilers (ReB 2012)

L.N. Satapathy*

The circulating "Fluidized-bed Combustion" (CFBC) technology selectively utilizes all grades of coal in an environmentally clean and efficient way and is therefore expected to out-last conventional coal burning technologies for power production. Refractory material plays a very important role in generating and maintaining the efficiencies of the Boiler. Proper selection of refractory material which can be adapted to variety of fuels used in CFBC boilers is very crucial for maintaining efficiency in a long run. Keeping in mind the large potential of CFBC boilers in the future, the Indian Ceramic society, Bangalore chapter, came forward in organizing a two day seminar jointly with Bharat Heavy Electricals Limited (BHEL) in **Bangalore (India)** during **August 30–31, 2012** to discuss issues related to refractory requirement of CFBC boilers.

Inauguration

The seminar was attended by 271 registered delegates representing more than 100 large and small sector organizations from six countries around the world. The seminar was inaugurated by **Shri A. V. Krishnan**, Executive Director of BHEL of Tiruchy, Tamilnadu (India). Among others, **Dr. A. L. Shahshi Mohan**, President of the Indian Ceramic Society, spoke during the inauguration of the event.

Inauguration of ReB 2012 at Bangalore

Key notes

The technical sessions started with a key note address by **Dr. A. K. Chattopadhyay**, Managing Director of TRL Krosaki Refractories Ltd. (India). He highlighted that more than 280 billion USD are expected to be spent on the power sector during the years 2010–19 in India and this will push the demand for refractories in the future. Since CFBC based boilers can accommodate all kinds of fuels, this technology will be more practiced in the future, which will enhance the demand of suitable refractories for such boilers.
The second day key note address was delivered by **Sri Hakimuddin Ali**, Managing Director of Calderys India Refractories Ltd, another major turnkey refractory suppliers for CFBC boilers. He emphasized the concerns of refractory manufacturers and highlighted a few significant new developments in this area.
A souvenir-cum-directory was released on this occasion by **Shri D. Ashok**, Executive Director/CBU of BHEL, containing the profile of 76 organizations dealing with refractories for CFBC boilers and 21 technical papers, besides 59 advertisements.

Release of souvenir-cum-directory by Shri D. Ashok

Technical lectures

There were six technical sessions during the two day deliberations comprising 26 lectures on subjects ranging from design consideration, operational, maintenance and performance issues, refractory products, application engineering, installation issues, raw materials and allied ceramic products. The invited talks highlighted that CFBC technology holds the key to the future in thermal power sector because of the following advantages: fuel flexibility, low operating temp. 850–950 °C, low NOx emission of <150 ppm, in situ SO_2 capture up to 95 %, high reliability and low maintenance, space compatibility and easy removal of ash.

During the discussion it was pointed out that the increase in demand for CFBC boilers requires large quantities of refractories in the combustion chamber especially in the lower part, cyclone system, bed/ash return system and in the outlet system. The refractories for such applications should satisfy most of the following requirements: high abrasion resistance (<10 ccm), CO resistance, low permanent linear change (to accommodate frequent thermal cycling and maintaining high spalling resistance), optimum castable curing temperature and setting time, which decide the strength and abrasion resistance etc.. Further, the proper pore size distribution, proper selection of aggregate and binder and optimum water content play important roles in imparting strength and abrasion resistance to the castables. It was also pointed out that the impurities in raw materials varies from batch to batch and this needs constant monitoring in order to avoid failure from a particular batch. Other important issues to be noted for refractories for such applications include: effect of shock absorption which changes surface of refractories, alkali accumulation at 600–700 °C in pores which decreases elastic modulus, spalling resistance and expansion provision during installation etc. Further care must be taken to choose a suitable material since the surface abrasion of refractories in coal boiling condition varies with the impact angle.

The best quality refractories for CFBC boilers can be achieved by properly optimizing the material and test characteristics during refractory manufacturing. For example the thermal shock resistance can be improved by decrease in thermal expansion, increase in strength, decrease in elastic modulus, increase in fracture toughness and decrease in thermal conductivity. Similarly, the wear resistance can be improved by decrease in crystal size, increase in density and increase in fracture toughness. It is recommended that the use of gunning mass must be practiced wherever applicable to reduce human error among other advantages. The refractory lining must be kept in dry condition by ensuring proper air circulation in order to avoid the formation of harmful chemical products such as carbonates and sulfates and increase the loss on ignition which deteriorates the refractory performance in the long run.

One of the major challenges the boiler users face is the falling of refractories during operation. The seminar discussed this issue in detail and recommends finding out the root cause analysis to understand the minute details of failure such as corrosion, abrasion, thermal shock or a combination of two or more of such factors. This analysis will also benefit in understanding the material unsuitability for the furnace environment, design issues including size of the panels, refractory installation including anchoring especially in complicated areas, operating condition including impurities in fuels (corrosion) leading to unwanted phases such as leucite or orthoclase forming on refractory surface, storage related issues and improper flow passage of gases etc. It is recommended that the boiler manufacturers must consult the refractory experts prior to specifying the material for suitable applications in CFBC boilers.

The technology of refractories for CFBC boilers are changing and over the last few years many new developments have taken place such as: abrasion resistant castables with abrasion loss <3 ccm, new pre-mixed plastic with unlimited shelf-life, versatile repair material, switching over from high cement castables to low cement castables, and then to no cement castables, castables for long stability at high temperature, phosphate bonded plastic with abrasion loss <1 ccm, use of ceramic anchors beyond 1250 °C, corrosion and erosion resistant ceramic coatings of 600 µm up to 1800 °C, new light weight refractory technology for improving efficiency, e.g. high alumina plastic material with abrasion volume loss <4.4 ccm and high temperature wear resistant castables.

Besides the refractory issues in CFBC boilers, the seminar also discussed few other important related issues such as ash related problems like clinker formation and evaluation of clinker formation in boilers by ash fusion temperature, high temperature ash viscosity and chemical composition of coal ash, full scale Computational Fluid Dynamics (CFD) studies by geometrical modeling, improved raw materials for castables and wool based insulation materials.

Since coal is the present and future of power generation in a country like India, making power generation more efficient lies with the efficient design of boilers and the refractories. Thus, the aim of this seminar was to make a roadmap in that direction. At the end of two day technical deliberations, a panel discussion was held to arrive few major recommendations as outlined below:

1. framing quality assurance measures for acceptable life and performance of refractories and standard for assessment of refractories in a CFBC boiler,
2. establishing elevated temperature testing methods required for CFBC applications,
3. providing guidelines for the desired refractory laying procedure and training and certification of refractory laying masons and supervisors for CFBC boiler,
4. setting up an Indian working group for drawing specification & quality standards for CFBC refractories and adhering to such guidelines.

Conclusions

In summary, the deliberations in the seminar have confirmed that the boiler efficiency is dependent on CFBC refractories. Therefore, an interdisciplinary close-coordination is required among all the stakeholders such as boiler designers, R&D scientists, refractory manufacturers, transporters, storage personnel and applicators for achieving the best performance in CFBC based power plant.

* Dr. L. N. Satapathy, Ceramic Technological Institute, BHEL-Corp. R&D, Bangalore, India. E-Mail: satpathy@bhelepd.com