SGT NEWS

Annual conference will look at history

The 2008 SGT annual meeting will take place in September at New Hall College, University of Cambridge. There will be both industrial and science programmes, a New Researchers' Forum on Glass, a sol-gel workshop and heritage and history sessions. The Heritage and History strand of the 2008 conference programme is detailed here.

Established in 1916, the Society of Glass Technology brings together the research of academics throughout the world and the needs of glass manufacturers and artists, to encourage the cross fertilisation and practical application of ideas for the benefit of the whole glass community. One of the ways in which these aims are achieved is by holding an annual meeting, for which the History and Heritage programme is provided.

History and Heritage programme

Plenary Session:

- *Wonders of Glass: Our Heritage from Earliest Times and into the Future* by Professor Malcolm Ingram, University of Aberdeen
- *Marinha Grande glass – a contribution to its history* by Filipa Lopes and António Pires de Matos
- *Effect of the Industrial Revolution on how glassmakers see their art* by Ian Hankey
- *Aspects of Conservation of Glass* by Sandy Davison
- *Aspects of Conservation of Glass* by Kenneth Watt, West Dean College
- *How to Save these Fabulous Shards?* Hilde Wouters, The Archaeological Window Glass Collection of the Dunes Abbey in Koksijde, Belgium
- *Research – The Stained Glass Museum at Ely* by Rosie Mills
- *Glassmaking defects - the Building Conservator's Friends* by David Martlew
- *Victorian Stained Glass - an Introduction for Window Spotters* by Ruth Cooke, Jonathan & Ruth Cooke Ltd

Wonders of glass

This talk is a celebration of how glass has transformed our lives from the earliest times to the present day. This journey through the 'ages of glass' will visit briefly the time of the pharaohs, observe the emergence of a successful glass industry in the Roman Empire and its spectacular re-emergence in Medieval and Renaissance Europe, before moving on to modern developments. The applications of chemical and now physical principles are extending the uses of glass into areas such as optical communication and energy management and are opening up new opportunities in medicine, as well as new responsibilities for the storage of nuclear waste.

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Marinha Grande glass

Coina factory was an important manufacture established near Lisbon by the King D João V of Portugal and worked from 1719 to 1747. Then it was transferred to Marinha Grande under the administration of John Beare. Some years later it was named Real Fábrica de Vidros da Marinha Grande (Royal Glass Factory of Marinha Grande) under the administration of William Stephens. Marinha Grande continued to produce the same type of glass objects made in Coina as indicated by one catalogue from Coina used in Marinha Grande. Therefore objects from Marinha Grande factory are very similar in shape and decoration to those that were produced in Coina. Marinha Grande continued production until 1992 under the name Fábrica-Escola Irmãos Stephens when it finished its production.

Aspects of conservation of glass

Kenneth Watt is programme leader and tutor at West Dean College on the Conservation of Ceramics and Related Materials programme. A ceramics graduate, he has worked at Glasgow Museums before teaching at West Dean. The graduate and the postgraduate programmes at West Dean College have developed as unique within their field. Through studying primary source objects of archaeological and historical importance students learn how to develop appropriate treatments and devise solutions to conservation problems.

How to save these fabulous shards?

As far as Belgium and archaeological window glass is concerned, the most important Cistercian site is the Dunes Abbey, Koksijde (County of Flanders). Excavations took place between 1949 and 2006. Until now a fully integrated report is lacking. This collection of archaeological window glass contains more or less 15,000 fragments of stained and plain window glass. The dating range is 13th Century to 1578, when the local protestant authority confiscated the abbey and started with the demolition of the whole site. Most of the fragments were once part of grisaille windows but coloured and figurative stained glass was also part of the fenestration of the monastery in this dating range. This collection is in a precarious condition as it was badly excavated and stored for decennia and will be totally lost without professional conservation treatment. This contribution is a first glimpse about how these fabulous shards were found, what has been done and what is planned for the near future to save this unique part of cultural heritage.

Research at the Stained Glass Museum

Why was the Stained Glass Museum established and what does it mean today? As the only museum in the country devoted solely to stained glass, it occupies a special place in the appreciation and understanding of the medium. The opportunity to study stained glass at close quarters in the gallery and research facilities at Ely is a chance to inspire new audiences to explore the stained glass heritage that is still to be enjoyed in our many historic buildings.

Glassmaking defects

Since the late Middle Ages manufacturing processes for making window glass have evolved in pursuit of improved quality and lower costs. Each successive method of manufacture imposed its own fingerprint on the finished product, often visible in the nature of the inevitable defects left in the finished sheet. Today's readily available window glass achieves a degree of perfection inconceivable before the early 1960s.

If possible, any restoration of a building's glazing should employ glass which has been made by the same process as that used originally. The conservator, therefore, must appreciate the various methods of manufacturing window glass used during the last 500 years or so and be able to identify the nature of the original glazing if a sensitive and aesthetic restoration is to be achieved.

Victorian stained glass

This presentation aims to interest those who enjoy looking at church windows and would like to identify their makers. By examining clues in the form of stylistic and other characteristic detail in windows by Clayton & Bell, Hardman, Wailes and others, it aims to help church visitors identify windows by some of the prolific Victorian firms whose work is to be found throughout the UK and beyond.

Details on the full programme for the Cambridge 2008 Annual Meeting are available on the SGT website www.sgt.org

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Looking back at Furnace Solutions success

As this year's Furnace Solutions conference arrives, the SGT looks back at the achievements of the 2007 event, remembering some of its speakers and the topics they covered.

Furnace Solutions 2 was last year's one-day conference organised by the SGT's Melting Technical Committee. The emphasis of the Furnace Solutions series of meetings is on sharing experiences and proposing practical solutions to the glassmaking challenges of today. In particular, the main theme of the 2007 conference was the various routes to melting cost reduction. There was a high level of support for this meeting, with attendees from many of the UK's glassmakers and industry suppliers.

Emergence of calumite

Dr Nicola Marriott of Calumite and Mrs Melek Orhon of Sisecam presented results of the successful introduction of calumite into a green container furnace. Calumite is increasingly becoming known as an environmentally beneficial alumina source, due to its ability to reduce energy consumption, reduce furnace temperatures and reduce CO_2 and NOx emissions.

In flint container production the calumite is typically 6 to 7% of the dry sand weight. Green glass is typically 10 to 13%, while amber has seen additions of up to 18% of the dry sand weight. In float the usage levels range typically from 4% to 8% of the dry sand weight depending on glass colour. Glass fibre has been made with calumite at 5% of the total batch weight.

A successful two week trial of calumite in a green container furnace at Sisecam's Mersin plant was described. Calumite was introduced to the 250 tonnes/day furnace in 2 or 3% stages to the maximum level of 13% of the dry sand weight, resulting in savings in energy costs, increased furnace pull and improved glass quality.

During the trial furnace bottom temperatures increased, allowing a 25% reduction in electrical energy consumption. In addition there was a modest reduction in fuel oil consumption, resulting in a 5% reduction in the total energy cost per tonne of glass produced. An increase in furnace pull to 3% above the previous furnace maximum was achieved with improved glass quality. Colour parameters were maintained with no problems throughout the trial.

Cullet additions

Maximising cullet additions in container glass manufacture has its problems. How much green is allowed in a clear glass batch before it affects consumer perceptions? How can cullet be treated as a raw material and can it reach the same consistent standards as other raw materials?

Dr Brian Noble and Dr Nick Kirk of Glass Technology Services described the results of an 18-month Colourlite Waste Resources Action

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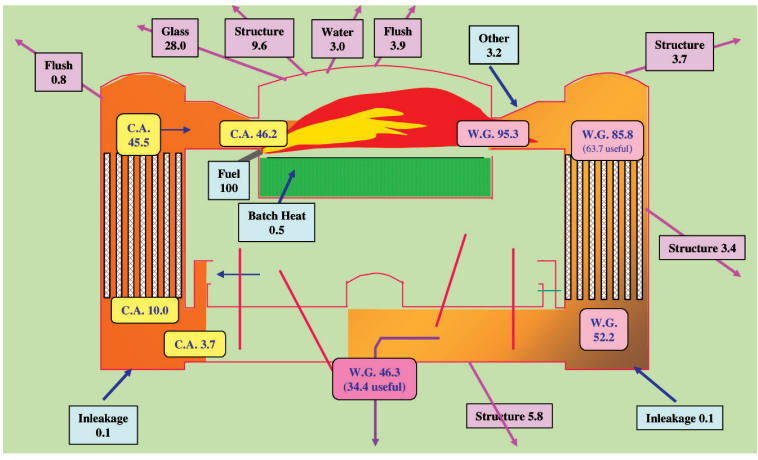
Where does the heat go?



Ian Shulver of Pilkington used this diagram to demonstrate energy losses in a typical float furnace.

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Programme (WRAP) supported project to investigate approaches of maximising cullet additions in container glass manufacture.

The project took a two prong approach, investigating commercial and technical barriers. The paper presented at Furnace Solutions 2 summarised the commercial barriers, which included a prediction of future waste arising, future container production and consumer perception of glass colour. The technical barriers were reported in greater detail, which included the development of a cullet specification in conjunction with the SGT and a decolouriser investigation on both a laboratory scale and full-scale industrial trials. The project identified opportunities for additional cullet use in container manufacture if the cullet is available at acceptable quality. For many consumer items there are no barriers to a 'greener' glass – from its source and its colour.

Melting practice

NOx and CO_2 emissions appear to be the two major factors that will shape melting practice in the glass industry for the foreseeable future, as explained by Richard Sims of Nikolaus Sorg.

However, the future may be approaching the glass industry far more quickly than we would like. Current furnace designs are already approaching the practical limits of NOx emission with conventional air-based combustion and significantly lower limits will be needed in the future. The practical results of the requirement to lower CO_2 emissions – embodied at the moment in Europe in the trading of emission certificates – is yet to be fully appreciated.

Nevertheless, pressure on the industry will increase to reduce energy consumption and thereby the output of carbon dioxide. The industry has been aware of the problem for many years and a number of solutions have been proposed, and in some cases, tried. An obvious one is the application of oxy-fuel heating, which potentially offers lower NOx and CO_2 emissions. A second option is the LoNOx Melter. The current emission situation was detailed and the advantages and disadvantages of the two concepts were highlighted on the basis of a comparison of two actual furnaces – a 400 tonnes/day oxy-fuel unit and a 380 tonnes/day LoNOx Melter, both used to melt container glass.

The comparison covers energy and emission levels but also includes other important topics such as investment costs, furnace life, space requirement, maintenance and peripheral equipment. Oxy-fuel melting with batch and cullet preheating or a large conventional furnace with catalytic converter are the choices for the future with oxy-fuel offering the best fuel efficiency thus the lowest CO_2 emissions.

Forecasting variation

Hans Mahrenholtz of Linde Gas and Andre Ommer of Ogis looked at optimising glass melting processes with energy and mass balance calculations. With the experience on a large variety of furnaces and projects it is possible to forecast possible variations mainly focusing on the fuel consumption, such as: Electricity versus fuel as well as fuel changes; batch and/or glass changes; heat recovery modifications; production increase (with additional electricity or oxygen); conversion from air-fuel to oxy-fuel combustion (or vice versa); and recuperator or regenerator repairs.

All these forecasts can be made solving the heat and mass balances of a specific furnace. Based on an existing furnace a forecast can be very accurate. The fundamental idea behind is that with the given parameters the overall losses can be calculated very quickly without evaluating the furnace refractory conditions in detail. Within a specific forecast these losses will not change significantly.

Economics of melting

Using the example of a float glass furnace, Ian Shulver of Pilkington illustrated how the potential savings, from improved energy efficiency, must be considered against their potential impact on the overall economics of the melting process. Additional factors to be considered include glass quality, product and furnace life. The importance and cost–benefit of operational improvements are also illustrated.

Changes made to a furnace must not focus on thermal aspects alone but must take account of: Effects on glass quality; effects on ability to make to budget; and impact on furnace life. Most importantly they should also be cost effective within the constraints imposed by the business. In this context, operational improvements are almost a must since they generally cost 'nothing' to implement and can be implemented with immediate effect.

A CD-Rom of the Furnace Solutions 2 meeting is available from the SGT office. ■

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