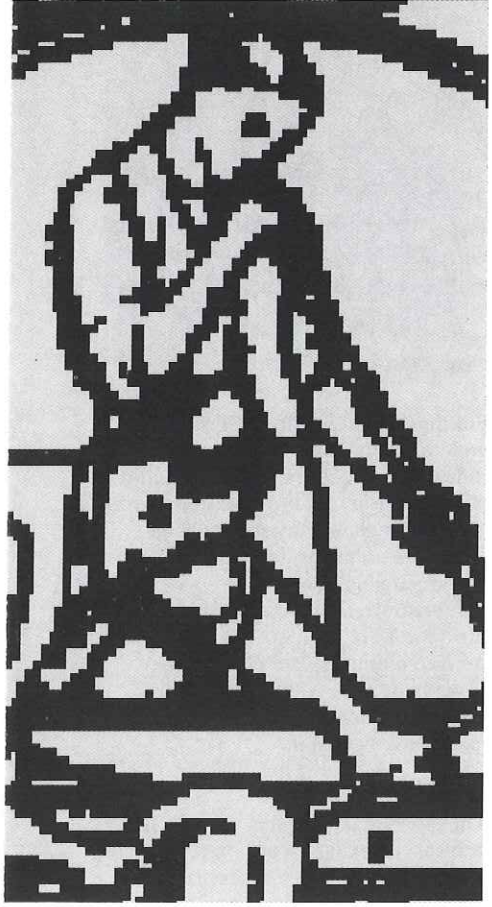


NO. 4 1995

SGT NEWS

Compiled and published by FMJ International Publications Ltd on behalf of the Society of Glass Technology

IN PRINT

The August 1995 issue of *Glass Technology* features papers on decorating, the effects of oxy-fuel beyond just melting, solutions to nickel sulphide problems in toughened glass and glassfibre through the decades taken from the Society's Spring Meeting on glass opportunities. Refereed papers included in the issue are on silver diffusion kinetics in ion exchange photochromic glasses; decay of 16th century stained glass in York; homogeneity of fluoride glasses; and recent excavations at an ancient Egyptian glassworks at Tel el Amarna.

***Physics and Chemistry of Glasses* has papers on the viscosity of lead silicate glasses below the transition temperature; optical absorption and EPR of Cu(II) in an alumina rich phosphate glass; study of dispersion and solubility of dihydroxyanthraquinone in a silica gel; density model for lithium, sodium and potassium borosilicate glasses; optical absorption spectral studies of rare earths in $CaO-B_2O_3-Al_2O_3$; diffusion of sodium and iron in oxide and oxynitride glasses; substitution of CoO or NiO in place of MgO or CaO in $MgO-CaO-Al_2O_3-SiO_2$ glass ceramics; and the effect of pressure and pressure revitrification on the structure and properties of silver iodomolybdate glasses.**

Both *Glass Technology and Physics and Chemistry of Glasses* feature a wide range of abstracts from technical and scientific publications.

SPRING MEETING ARRIVES EARLY IN 1995

The Society's Spring Meeting was brought forward to Thursday 30 March-Saturday 1 April in an agreement to accommodate the third ESG Conference in Würzburg, Germany, which fell near the traditional May date of the meeting. The meeting followed the theme 'Glass Opportunities' and looked at developments which were helping to maintain and increase the markets for glass products and the manufacturing processes involved in their efficient production.

The first morning was taken up with a visit to Pilkington's Greengate works in St Helens. Numbers were limited for the visit; bookings had to be made in advance and, unfortunately, no last minute entries were allowed. The visitors were welcomed by Dr Bill Pardoe, float manufacturing manager and Glyn Davies, works manager for Greengate. Mr Davies gave a brief introduction to Pilkington and some history of the Greengate works.

The Greengate works occupies an 80 acre site which was once a large parcel of derelict land with several mine shafts making the area difficult to develop. Clearance of the land and construction of UK5 started in 1978 and the line came on stream in 1981. The first campaign ran for just under 12 years, the longest recorded for a float furnace. During that time UK5 melted more than three million tonnes of glass. The rebuilt furnace currently produces around 6000 tonnes of clear glass every week.

In 1992, UK6, the second float line on the Greengate site came on stream. This features the most

About 80 delegates attended the keynote address given by Dr John Nolan on the subject of the packaging marketplace.

modern technologies and advanced glass handling equipment. It produces clear glass at a rate of 4500 tonnes/week. On the day of the visit UK6 was producing a clear 3mm thick glass for lamination into automotive windscreens. The Society party was conducted down the 600m line by Mr Davies.

Starting at the batch charger the group followed the flow of glass to the bath of molten tin where it forms a ribbon. As the glass cools it is held by pinch rollers which control the speed of the line and the ribbon thickness. The glass is annealed and then cooled to ambient temperature where it is washed in deionised water to remove any dust picked up travelling down the line. A scanning laser inspection machine immediately following the wash picks out any defects. The glass is then cut using optimisation software to remove defects and the edges where the pinch rollers are in contact with the glass are removed.

After cutting the glass is automatically loaded onto frames for transportation. The Greengate works has a substantial area for storing glass before it is

dispatched but this never reaches its capacity. Some orders are sent as they come off the line.

KEYNOTE LECTURE

Dr John Nolan, managing director of Rockware Glass, presented the keynote lecture on the glass marketplace. He described the recovery of market share that the glass container had achieved over recent years but stressed that a lot of work still needs to be done if the industry is to prosper. While FEVE predicts annual growth of 4.9% up to the year 2000, the PET bottle is expected to achieve 8%-10% growth. Glass is lagging behind alternative materials.

New technical and marketing strategies have to be adopted if further growth is to be found. By failing to invest and being reluctant to adopt new technology the glass container has, in some cases, lost the market. Marketing has not focused on the customer base. There is also an opinion that the whole glass industry is not particularly good at product development.

As an example of the potential that exists for glass Mr Nolan commented that, while the weight of a milk bottle has halved from 500g to 250g, the average container weight produced in the UK has only reduced from 310g to 293g; in Australia the beer bottle has been reduced from 220g to 165g - more can be done. Since 1980 the material content in soft drinks containers has fallen by 31% for aluminium, 25% for plastics and 26% for glass, the competition is not standing still on lightweighting either.

Polymeric coatings are helping to sell glass, especially where strong branding is needed.

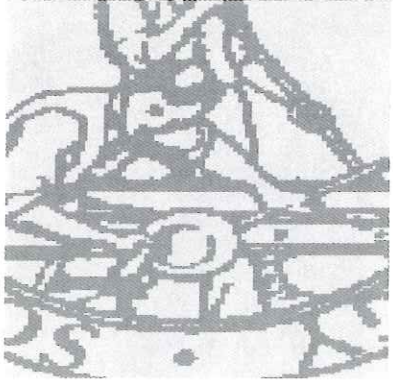
Labour costs have been chipped away over the last 10 years but they are still a long way above the baseline; pack rates of 95% are still not being achieved; capital costs still reflect the traditional overheads in the industry. If each of these issues could be addressed, the competitiveness of glass would be more apparent, with the constant warning that the competition is not standing still.

There are tremendous opportunities for the UK glass container industry and for the glass container as a whole. If glassmakers can work with their customers during this period of structural change for all industries, the future will be a bright one.

SECTION RECEPTION

The North West Section, as host for the meeting, held its reception on the Thursday evening. Wine was served in the exhibition area next to the conference room. Section Chairman, Dr D Martlew of Pilkington Technology Centre, welcomed participants, conference delegates, speakers, exhibitors and ICG Steering Committee members.

Master glass painter Ruth Cave then gave an illustrated talk, with an accompanying practical demonstration provided by her husband Ron. The various techniques used to colour a glass panel were described, as well as sandblasting, enamelling and assembly using lead came or copper foil.



EXHIBITION

The latest products and services from several companies were on display in a room next to the conference. Delegates had the opportunity to meet representatives from Avery Dennison, BOC, Frazier-Simplex Europe, SEPR, Springer Verlag, Stein Atkinson Stordy and TECO Europe. Also present were the Pilkington Glass Museum and the Hotties Science and Arts Centre.

ANNUAL DINNER AND DANCE

The North West Section combined its Golden Jubilee Dinner and Dance with the Society's Annual Dinner and Dance. More than 250 members and their guests attended. Grace was read by the Reverend Elliot of J B Treasure. The toast to the Society was proposed by Dr David Martlew, in response to which the President replied and proposed the toast to the guests. Professor Michael Cable replied on behalf of the guests.

Professor Cable chose two charitable causes for donations from the table raffle and tombola; these were the National Association for Colitis and Crohn's Disease and Research into Ageing. ■

Society of Glass Technology, 20 Hallam Gate Road, Sheffield S10 5BT. Tel 0114 2663168. Fax 0114 2665252.

AGM HIGHLIGHTS

The meeting was held at the Prince of Wales Hotel, Southport on Saturday 1 April 1995.

Mr R G Nickels was elected President for a second year of office. The nomination for President Designate put forward by Council, Dr Peter Sewell of Pilkington plc, was accepted by the Annual General Meeting and approved by a unanimous vote. The two Vice Presidents are Mr M C Brew and Mr W L Brookes.

Only four nominations had been received to fill the five vacancies caused by retirement, in rotation, of Councillors. Election of the four named (Mr A Croxall, Mr J Henderson, Mr R O'Connor and Mr A Whitehead) was proposed by Miss R M Sales, seconded by Mr J J S Lomax and passed unanimously.

AMENDMENT TO RULE 12

In order to comply with the Memorandum of Understanding with the Institute of Materials in relationship to Fellowship, it was necessary to add another clause to Rule 12 allowing Fellows of the Institute applying for Fellowship of the Society to be judged on the qualifications already put before the Institute.

SUBSCRIPTIONS REVISION

The Honorary Treasurer reported that the increase proposed from 1 January 1996 is again in line with inflation, being 3% rounded to the nearest 50p.

Mr R G Nickels informed those present that Council had authorised the formation of a Committee to look at the Society's long term financial position and the structure of membership. The withdrawal of one of the journal patrons meant a loss of almost £7000 and it was possible that others could follow suit. New sources of finance were therefore necessary and the fee levels would be fully reviewed during the coming year. ■

1996 SPRING MEETING

Glass Opportunities - the challenge for furnace and refractories, the Society's 1996 Spring Meeting, will be hosted by the North East Section at the Ramside Hall, Durham on 29-31 May. Suggested topics for the meeting include: New materials; furnace lives; operations control; fuels; NOx; alternative refractories; insulation; economics and costing; and target tonnes. Further details of the meeting can be obtained from Jill Costello at the Society.

SGT NEWS

NEW RESEARCHERS' FORUM ON GLASS

Following on from the successful first meeting held at the University of Warwick in December 1993, the Basic Science and Technology Committee organised the second New Researchers' Forum on Glass for April 1995. The meeting gave researchers new to the field of glass and glass ceramics the opportunity to present their initial findings, exchange information on problems, along with possible solutions and their overall impression of research work. Presenters of some of the papers from the first meeting were also present to update the audience with the latest news of how their work is progressing.

The spread of research covers a wide number of subjects from sol-gel techniques through to optical fibres, glass ceramic seals and glass beads for blast cleaning. The work is also spread throughout the country with representatives from Aberdeen, Liverpool, London, Paisley, Sheffield and Warwick.

G Gibbons of the University of Warwick gave details of his work with interpenetrating networks of long and short chain polysiloxanes as electronic device encapsulants. The good hermetic properties of the short chain polymer are combined with the flexibility of the long chain material to give an encapsulant that is both compliant and hermetic.

Inorganic together with organic/inorganic nanocomposite (ORMOCER) membranes are being investigated for exploitation in gas separation by S Bjokert of the University of Warwick. A flat membrane system is being developed using a commercially available, ceramic/metal, mesoporous composite (Ceramesh) as a substrate for the supported active membrane material. The active materials are produced using the sol-gel method.

All alkoxide and partial alkoxide sol-gel routes for the preparation of stoichiometric barium osumulite ($BaMg_2Al_6Si_9O_{30}$) glass powders were developed by U Jais of the University of Sheffield. Her sol-gel barium osumulite started to crystallise from the powders at 1000°C and was the dominant phase after 3h at 1200°C. Despite this, small amounts of celsian, hexacelsian and cordierite were present even after prolonged heat treatment.

A M Wooton of University of Warwick is working on sol-gel polycondensation/pyrolysis routes to prepare carbon containing multi-component glasses and glass ceramics based on Al-Si-O-C and B-Si-O-C systems. Subsequent structural investigations of his samples have used a combination of magic angle spinning nuclear magnetic resonance, X-ray powder diffraction and electron microscopy.

Glasses based on metal carboxylates and carbohydrates are good solvents for organic materials and have application for controlled release. The sites these glasses provide for metal ions are currently being studied by A Stewart of the University of Aberdeen using probe ion spectroscopy.

K F E Williams of the University of Liverpool is analysing Mossbauer spectra of tin in commercially produced float glass. The glass samples were taken from several manufacturing plants which produce glass by floating it on molten tin and also from different regions of the same glass ribbon. The depth profile of the oxidation state of the tin has been measured. The results show a changing ratio of stannic to stannous tin with depth into the glass, providing information on the relative strength of binding of the metal.

G O Kyd of University of Aberdeen has been using probe ion fluorescence to determine optical basicity and provide a measure of the electron donor properties of oxidic media. Her work provides information on the nature of the available sites within the glasses investigated.

Fast ion conducting glass systems exhibit conductivity limits at very high pressures which are not satisfied by any one theory. Hydrostatic and uniaxial pressure equipment, a

Page 4 ▶

SOCIETY OF GLASS TECHNOLOGY 1995/1996 MEETINGS PROGRAMME

The August mailing to members of the Society will include a detailed listing of main Society conferences, clinics and local section events for the 1995/1996 meetings season. The London, Midlands, North East, North West, Yorkshire and Scottish sections provide both technical and social events for local members and visitors to the area.

In addition, all the local section events are now co-ordinated with the Institute of Materials' equivalent regional programme.

LOCAL SECTION CONTACTS
For details of forthcoming local section events in your area, contact the following. All SGT members and non-members welcome.

London
– Mr T Ensor, United Glass Ltd, Porters Wood, St Albans, Herts AL3 6NY. Tel 01727 59261.

Midlands
– Mr R W Fisher, MRJ Furnaces, Unit 94, Heming Rd, Reddich, Worcester B98 0AE. Tel 01527 529810.

North East
– Mr J Henderson, 44 Woodside Ave, Throckley, Newcastle upon Tyne NE15 9BE. Tel 0191 264 4775.

North West
– Dr D Martlew, Pilkington Technology Centre, Hall Lane, Lathom, Ormskirk, Lancs. Tel 01695 54210.

Scottish
– Mr D A Rennie, United Glass Ltd, Glasshouse Loan, Alloa FK20 1PD. Tel 01259 218822.

Yorkshire
– Miss R M Sales, 20 Blackbrook Drive, Sheffield S10 4LS. Tel 0114 2306179.

Fielding 200 ton press, piston in cylinder pressure cell and tetrahedral anvil pressure cell, have been employed by B H MacMillan of the University of Aberdeen in order to investigate the variation of conductivity with pressure of silver iodide-silver molybdate glasses.

New fluoride and mixed halide glasses for fibre optic applications were reviewed by A Jha's group at Brunel University. The review concentrated on the applications of Pr^{3+} doped glasses, particularly on recent progress in the area of optical fibre amplifiers in the second telecommunications window at 1pm-3pm. Other uses of these dopants, such as near infrared and upconversion lasers, were also mentioned.

Dr D B Hollis of the University of Paisley presented work done by his research student X Liu on the development of high density, scintillating $BaO-Bi_2O_3-B_2O_3$ glasses. The glasses have been developed for stopping and calibrating the energy of high energy particles. This follows on from a call to glass researchers made by P S Flower of Rutherford Appleton Laboratory at the previous meeting.

A progress report was presented by M J Jackson of Liverpool John Moores University on the effect of glass content of the bond on the strength and safety of plain cylindrical grinding wheels. The bonds investigated are referred to as sintering (low glass content bonds used with silicon carbide abrasives) and fusible bonds (high glass content bonds used with alumina abrasives).

The limitations of glass ceramic graded joints were investigated by R S Dobedoe of the University of Warwick in conjunction with TWI, Cambridge. The application of recent theoretical work implies that any reduction in residual stresses resulting from thermal expansion mismatch is limited by the thickness of the joint. Predictions were compared with experimental results.

P G Glass at AWE, Aldermaston is investigating glass ceramics for bonding to AISI 304 stainless steel. Three new lithium aluminosilicate glasses have been developed for this purpose.

The strengthening of glass beads for use in abrasive blast cleaning is being investigated at the University of Sheffield by S Blackburn. Commercial soda lime-silica glass beads were tested to failure under diametral compression in environments of oil, air and water, at different rates of loading. Lower strengths obtained for beads tested in water have been interpreted as indicating failure that is initiated from the surface, contrary to the conclusions of previous published work. An ion exchange surface treatment on the beads resulted in a 100% increase of strength.

PRIZE FOR BEST PRESENTATION

The Basic Science and Technology Committee awarded a prize of £50 to the best presentation of the day. This was very hard considering the overall high standards but they selected Kyle Williams of University of Liverpool for her paper 'Mossbauer spectroscopy of tin in float glass'. ■

UK GO MEETING

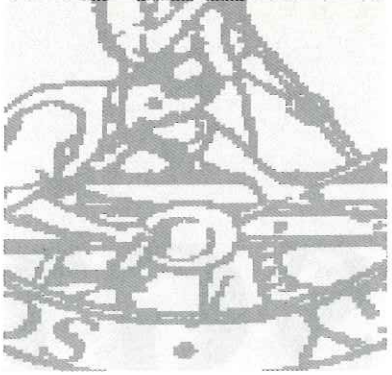
The glass for optoelectronics specialist interest group is organising a meeting on rare earth doped glasses. The one day event will be in late September or early October, a venue has yet to be confirmed. Further details can be obtained form Jill Costello at the Society.

SGT GLASS INFORMATION GROUP

The number of individuals, companies and organisations providing information on all aspects of glass has increased to 14. Areas of expertise include: Refractories; imported glass; training; raw materials; special glasses; historical glasses; scientific glass; and studio glass making. Queries on glass can now be referred quickly to the specialist most capable of providing the best information.

The specialist interest group is also looking to organise a one day meeting on glass information systems some time in 1996.

Compiled and published by FMJ International Publications Ltd on behalf of the Society of Glass Technology



FELLOWS LUNCHEON

All Fellows of the Society are invited to attend a luncheon with their partners at Northcote Manor, Langho, Blackburn on 22 September. The meal will be preceded by a visit to Philips Components' factory at Simonstone, Burnley. There will be a charge of £17.80 per head for the meal. However the sherry served on arrival and the wine during the meal will be paid for by the President, Mr R G Nickels. Further details can be obtained from Jill Costello at the Society's offices in Sheffield.

GLASS SELLERS AWARD FOR SCIENCE AND TECHNOLOGY

Following the closure for entries on 31 May, judges are now assessing the four entries for the £1000 prize and trophy for technical achievement.

CLINIC MEETING - POTS

The venue for the Hand Made Glass Committee's clinic meeting on pots on 4 October has been confirmed as the Whittington Inn, Kinver, near Stourbridge. The meeting will look at the best pot material for quality glass, how glass compositions affect pot life and why pots fail.

REFRACTORIES UNDER ATTACK - THE USER'S VIEW

The Refractories Committee of the Society and the Institute of Materials will be contributing to a one day meeting organised by the Institute of Refractories Engineers at Ranmoor House, Sheffield on 1 September. Further details of the meeting can be obtained from J B Traynor, General Secretary, Institute of Refractories Engineers, 15 St Benedict's Road, Wombourne, Wolverhampton WV5 9HP, UK. Tel 01902 894799.