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Kañeh



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Quarterly Journal of **The All India Glass Manufacturers' Federation**
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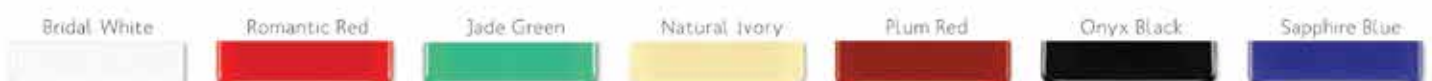
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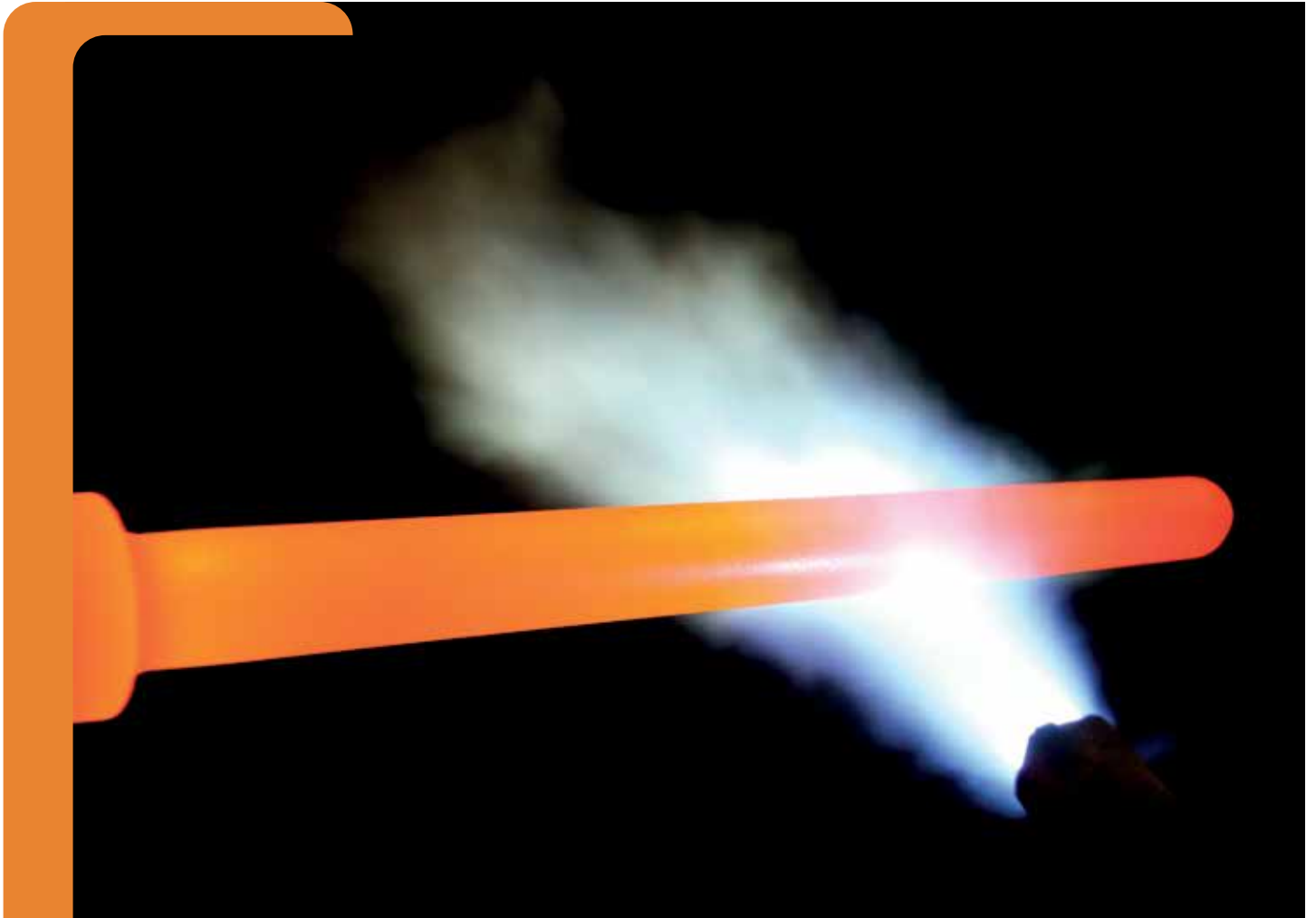
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T: +91 11 23316507 F: +91 11 23350357 E: info@aigmf.com

Editor MOHAN LALVANI

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Quarterly Journal of **THE ALL INDIA GLASS MANUFACTURERS' FEDERATION**

Vol. 1, No. 2, July-September, 2013

Contents

From President's Desk	5
About The All India Glass Manufacturers' Federation	6
Advertise in KANCH	8
Glass News India	9
New Members	10
Seminar on Competition Law / Marketing Excellence	11
A Glimpse of Glasspex India 2013 (Some Meetings and Short Interviews)	13
Membership of AIGMF	16
Dr. Devendra Kumar's, Professor, Department of Ceramic Engineering, Indian Institute of Technology, (Banaras Hindu University) visit to Gujarat Guardian Ltd., Float Glass Plant at Ankleshwar, Gujarat	17
Sentryglas Provides High Resistance to Temperature and Humidity on Façade in Abu Dhabi	21
Solar Control for Brisbane's Tallest Office Building	27
Synthetic Coolants Improve the Glass Grinding Process	31
Glass Technology Services	35
Glass Collection and Recycling in Italy	41
Extended Producer Responsibility	45
Special Glasses for Electro-Chemical Applications	47
List of Advertisers	50
Do your bit and stay Eco-Friendly	51
11 th edition of CII-IGBC Green Building Congress 2013	53
काँच प्रौद्योगिकी, उद्योग व व्यापार का सम्पोष्य विकास: समन्वित सहयोग की महत्ता (Sustainable Development of Glass Technology, Industries and Business; Importance of Mutual Cooperation)	55
Glass News Worldwide	59
Environment	62

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From President's Desk

Highlights of Glasspex India 2013 were published in last issue of Kanch. For the benefit of those who could not find it possible to visit Glasspex or could not spend sufficient time to interact with many participants in the exhibition, in this issue we are publishing some interesting details about a few companies whose CEO's were interviewed by Dr. A K Bandyopadhyay, Member Editorial Board, KANCH. Hopefully these will be of interest to readers. Those interested in getting such interviews published in KANCH may write to AIGMF at info@aigmf.com



In the recent past, along with the Executive Committee meetings, Federation has been organizing add-on events/presentations on various subjects for the benefit of glass industry. In continuation of this endeavor on June 7, an Interactive Session was organized on 'Competition Law & Trade Associations' to generate awareness among the members on competition compliance programme. A presentation on the subject was given by Mr. P K Singh, Adviser (Law), Competition Commission of India. Dr. A K Bandyopadhyay (Director, Bengal Institute of Technology & Management, W. B. University of Technology, Bolpur, West Bengal; Ex-Principal, Govt. College of Engineering & Ceramics Technology, Kolkata and Member Editorial Board, KANCH) also gave a presentation on 'Marketing Excellence in Today's Competitive Industrial Scenario'.

AIGMF will be participating as a supporting association in the Indian Green Building Congress (IGBC) organized by Confederation of Indian Industry from October 24-26, 2013 at Chennai Trade Centre, Chennai, wherein stall # 114 has been allotted to AIGMF. The vision of the IGBC is to enable sustainable built-environment for all and facilitate India to be one of the global leaders in sustainable built-environment by 2025. This will show our continued interest in eco-friendly activities. Members wanting to display their samples may kindly intimate AIGMF office well in advance.

With the festival of lights around the corner, I convey my best wishes to one and all for Happy Diwali, on behalf of myself as also other office bearers, members and staff of the AIGMF.

A handwritten signature in black ink, appearing to read 'S C Bansal'.

S C Bansal
President AIGMF

and Managing Director, Adarsh Kanch Udyog Pvt. Ltd./
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About The All India Glass Manufacturers' Federation

The All India Glass Manufacturers' Federation was founded in 1944. The Federation is made up of five Regional Associations viz. Western India Glass Manufacturers' Association-Mumbai, Eastern India Glass Manufacturers' Association-Kolkata, U.P. Glass Manufacturers' Syndicate-Firozabad, Northern India Glass Manufacturers' Association-Sahibabad, Ghaziabad (UP) and South India Glass Manufacturers' Association-Hyderabad. The Federation was incorporated under the Companies Act, 1956 (No. 1 of 1956) as a Limited Company on 15-6-1970. The main aims & objects of the Federation are:-

- To encourage, promote and develop the manufacture of glass articles of all kinds and to safeguard and protect the interests of glass industry and glassware business in India.
- To form a common link amongst Glass Manufacturers' in India and thus develop a spirit of mutual help and co-operation with one another.
- To promote the study and research in Glass Technology.
- To consider all matters relating to the manufacture and marketing of glass articles in India and the question of export and import thereof.
- To devise ways and means for securing necessary supply of raw materials required for the manufacture of glass articles at comparatively lower prices and thus to decrease the cost of production and increase the national wealth.
- To collect necessary information and data and propagate it for the benefit of Glass Industry and trade in India.
- To make representations whenever necessary to the Union Government or any unit of the Union of India for the removal of difficulties that might hamper the trade of glass articles or for grant of special facilities for the Glass Industry.
- To draw Government or public attention to the difficulties in the way of Glass Industry and to solve other problems confronting it and to solicit their help and support through concerted action.
- To organise a united front on behalf of all glass manufacturers and thus strive to gain all those advantages which may not be possible through individual effort.

All those engaged in the manufacture of glass and glass articles are enrolled as 'Ordinary' members of the AIGMF and those associated with the Glass Industry are enrolled as 'Affiliate' members of the Federation.

Almost all glass manufacturers including many in the small Scale Sector are 'Ordinary' members of the Federation. Articles of Association of the AIGMF were amended in September 1992 to enroll foreign companies as Affiliate Members of the Federation.

Manohar Lal
Secretary AIGMF



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Contact AIGMF Secretariat:

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Glass News **INDIA**

JOINT VENTURE PARTNERSHIP ESTABLISHED IN HNG FLOAT GLASS LIMITED (HNGFL) BETWEEN THE EXISTING PROMOTERS (HNGIL AND SOMANY FAMILY) AND TRAKYA CAM SANAYII AS OF TURKEY

HNGIL (Hindustan National Glass & Industries Limited), India's largest glass container manufacturer, a listed entity and other existing promoters of HNGFL (being C K Somany family, together with HNGIL, collectively referred to as HNG Group) have established an equal joint venture partnership with Trakya Cam Sanayii for jointly pursuing the float glass business in India, under the aegis of HNG Float Glass Limited (HNGFL).

Trakya Cam Sanayii AS, a Sisecam group company headquartered at Turkey, ranks fourth in Europe and sixth globally in the float glass industry. Trakya had a turnover of around USD 700 million for the FY 2012 and a market-cap of USD 1.1 billion as of the end of 2012.



The two sides had signed a joint venture agreement (JVA) on January 10, 2013 with the intention of jointly pursuing and developing the float glass manufacturing business in India, value added processed float glass including high performance glazing glass and Automotive glass segment. The parties having complied with the relevant conditions precedent under the JVA, the joint venture transaction has now been consummated.

In the closing ceremony, Prof. Dr. Ahmet Kirman, Vice Chairman of the Board and CEO of Sisecam, in his comment stated: "Trakya Cam under its vision of being a fast and sustainable growing global flat glass company, and also seeking opportunities in developing countries offering high growth potential, has now entered the Indian market with this partnership through an investment of 61 Million USD."

Mr. J. P. Kasera, Senior President, HNGIL stated that this is like opening up of doors of opportunities for HNGFL in the Float Glass Industry in India, as the association of a strong foreign partner (Trakya) adds tremendously to technological capabilities of HNGFL to make inroads into value-added and Automotive glass segment.

As part of the transaction, Trakya has also acquired IFC Washington's 12.36% stake in the Company (HNGFL). Post consummation, Trakya owns 50% stake in HNGFL, and the stake of HNG Group stands reduced from

88% to 50%. In the process, HNGIL's shareholding in HNGFL has also come down from existing 47% to 18%. HNGIL has raised – Rs. 135 crores through sale of HNGFL shares to Trakya. Trakya has also invested Rs. 150 crores in the form of primary infusion in HNGFL.

INDIAN SCIENTIST CREATES BREAKTHROUGH COST EFFECTIVE ANTI-FOG GLASS COATING

Dr. Swapan Ghosh, a leading polymer scientist and Founder - Director of Nova Surface Care Centre, a surface science research company - has developed a path breaking and cost effective invention for anti-fog on glass. The product in form of a coating will ensure that the glass will be free of fog. The coating works on a concept of formation of non-scattering film of water instead of single droplets. Says Dr. Swapan Ghosh, "India being the region with high humidity levels, fog poses a great challenge due to moisture condensation. After condensing, tiny droplets are formed in such a way that it scatters light very easily and because of this visibility through transparent substrates gets hampered. This can create havoc especially during monsoons. The invention especially with its affordability can be used on trucks, rickshaws and other public transport enabling wide range use and ensuring fewer mishaps during accident prone weather conditions."

Currently, there is an unmet need for long-lasting

and mechanically robust anti-fog coatings that can operate under a variety of different fogging challenges (e.g., temperature and humidity). Most of the anti-fog coatings won't withstand washing, so the product application must be repeated regularly.

On his invention Dr. Swapan Ghosh says, "We have developed a coating material which not only has a single layer of application with conventional do-it-yourself (DIY) types of tools but also shows excellent mechanical durability (can take 500 wet scrub cycles) and optical transparency in both cold and hot condition and in extremely high relative humidity (99%). In this invention, we have used hydrophilic polymers from renewable bio-feed stock that allows water droplets to spread homogeneously over the surface and don't show any swellability due to high degree of cross-linking. The resulting coating system forms a thin, transparent, single layered coating that does not alter the optical properties of the surface in fogged condition."

This coating is suitable for application on glass mirrors in bathrooms, doors of shop refrigerators, windshields, eyeglasses, goggles, camera lenses, and many other transparent glass or plastic surfaces. Patent is being applied to protect this invention. Negotiations are already underway with major chemical companies interested in obtaining a license for this technology. ■

(Glass News Source: World Wide Web)



Welcome its New Members

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2.	Mr. A. Dasgupta FGK Thermal Pvt. Ltd. 38 L, Maharaja Tagore Road, Kolkata – 700031 T : +91-33-24296567 / 6722 F : +91-33-40007877 M. : 09834744247 E : fgkthermal@rediffmail.com	Machinery required by the Glass Industry
3.	Mr. Pankaj Gupta KVG Enterprises Pvt. Ltd., B-43, Sector – 2, Noida, UP - 201301 T : +91-120-4120001, F : +91-11-40444099 M : +91-9910249102 E : pankaj@kvgprojects.com	Moulds / variable and spare parts for IS machinery.

Seminar on Competition Law / Marketing Excellence

(June 7, 2013)



The All India Glass Manufacturers' Federation along with its Executive Committee organized a Seminar on Competition Law / Marketing Excellence on June 7, 2013 at India Habitat Centre, New Delhi.

Presentations on "Competition Law & Trade Associations" by Mr. P K Singh, Adviser (Law), Competition Commission of India and "Marketing Excellence

in Today's Competitive Industrial Scenario" by Dr. A.K. Bandyopadhyay (Director, Bengal Institute of Technology & Management, W.B. University, Bolpur, West Bengal; Ex-principal, Govt. College of Engineering & Ceramics Technology, Kolkata and Member Editorial Board, Kanch) were given during the seminar.

Mr. Singh gave an overview on



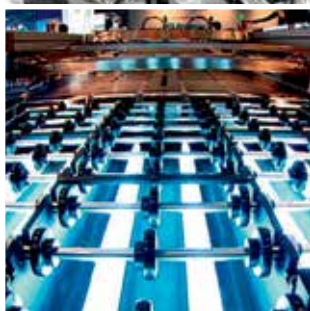
applicability of competition law to trade associations, competition compliance programme, role of trade associations in promoting competition compliance, some Do's & Don'ts (important for associations), etc.

It was concluded that Compliance of Competition Law is the best policy for

associations of enterprises as 'prevention is better than cure'. It was also mentioned that at present 120 countries have competition rules in place, competition compliance requirements are here to stay.

Dr. Bandyopadhyay gave a detailed lecture on Marketing Excellence, What Marketing got to do with the Competition?, Marketing Model, Communication, Creativity, Consolidation of Goals, Customer Satisfaction, etc.

Presentations were appreciated by all. Complete Presentations can be downloaded from <http://www.aigmf.com/past-events.php#18> ■



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A Glimpse of



Some Meetings and Short Interviews

Prof. (Dr.) A. K. Bandyopadhyay

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WEST BENGAL UNIVERSITY OF TECHNOLOGY, KOLKATA.
asisbanerjee1000@gmail.com

Abstract:

In any exhibition or seminar where like-minded people meet, such as Glasspex-India of larger dimension, it is but natural that we meet some interesting people and familiarize ourselves with their interesting range of products. A brief discussion is given here on some of these people as well as to see what they have to offer to the glass community.

details on some of these companies are highlighted to acquaint our readers with certain facts in case they missed them out during their visits to this grand exhibition. It is equally important for those in the concerned industries, who could not find time to visit such an important event. These people could also be interested in some of these products and processes. While there are traditional products and process technologies to a large extent, there are also specialized products that are useful for diversification as well as processing systems that are useful for increasing the productivity of the glass industry. Interactions that bring the buyers and sellers together for a common goal which is mutually beneficial are useful. Excerpts from some of these meetings/interviews are given below - not in any particular order - but let us start with some engineering companies.

II. DESCRIPTIONS

As there were quite a number of engineering companies dealing with a variety of processes and installation techniques, it was found useful to visit 'stalls' of some of these companies for a short interview to get acquainted with their technology and products on offer - not by any particular choice or fascination - but purely due to preliminary interactions and opinions gathered. Let us start with some well-known engineering companies on the design and installation of refractories in the glass plants.

I. INTRODUCTION

In a large exhibition, such as Glasspex-India that was organized in a lavish manner, there is always something to write about which are otherwise forgotten. Various statistical facts on this grand exhibition in an important location in Mumbai (Goregaon) are available in this issue of Kanch. We not only met a lot of interesting people, but also came across a large number of glass products and related materials as well as a large section of engineering companies - starting with design companies to process technology. Moreover, there were companies trying to promote old equipment for glass industry that sounded quite feasible for Indian Glass Manufacturers. Some

2.1 Lizmontagens India Pvt Ltd (Mumbai):

As a part of a multinational company (Lizmontagens) with a group turnover of 130 million euros, this engineering company was established in India just in 2010. Within this short period, they have already achieved a sales turnover of Rs. 250 million. On order booking, they have Rs. 600 million with 30% on insulation and about 70% on refractories. That makes this small outfit quite interesting, particularly their youthful Managing Director: Sanjeev D. Prabhu who showed a sign of dynamism.

They serve a large number of industries including many start-ups, such as glass, refractory, oil & gas, fertilizer, cement, aluminium, power and obviously iron & steel industry where modernization is going on almost every other year that is also the largest consumer of various refractory products. Their specialty is that they have a very strong team of engineers and they do their 'project management' on their own. Moreover, they have their own workforce with supervisors that has given them an 'edge' on service delivery. As a strategy for expansion, they are soon going to open new outfit at Vizag and in Kolkata little later. Under the dynamic leadership of Mr. Prabhu, they were ambitious enough to project a turnover of Rs. 2 billion in 2015. Their USP is that they belong to a large group of companies, who are specialists in their respective field of operations, and also they have quite an impressive list of satisfied customers in the glass industry in India that should enable them to achieve the target to some extent from the glass sector.

2.2 Heat Applications India Pvt Ltd (Vadodara):

A British Citizen from Leeds, Anthony Kirkham (well-known as Tony in the glass community), came to India many times for Project Management in glass plants since 1976 and finally settled in Vadodara in 1990, and established this company specialized in the business of furnaces. Then came the joint venture with KTG that lasted for about 3 years. They deal with all types of glass companies having more than 20 TPD production. To their credit, they did installation work in 500 TPD Taloja plant, 740 TPD Asahi Float plant at Roorkee and many others.

The present turnover is Rs. 100 million and a steady growth of 10-15% is expected in the future, when Tony with his team wants to venture into the Asian market and in 2018 they expect a turnover of Rs. 180 million. As a strategy, they plan to appoint 'Agents' in other countries for the new business. Their main USP is: "*nothing too big... nothing too small*". With the type of personnel and a team with his wife (Neelima) as a Director, they expect to make their future objective fulfilled.

2.3 GPM (Ghislenghien, Belgium):

This is a very interesting company established in Belgium in 2000, with their stated objective as to serve the glass industry with project management and used equipment that are available at a 15-20% price of new ones, and they already have a turnover of USD 1 million. A very charming personality of Managing Director (Christian Vandenebeele) with his partner wife (Genvieve) makes a formidable team with some more people who are engaged during installation. Christian has 15 years of rich experience as project manager in Verlipack, Belgium.

They deal with IS machines, furnaces and inspection equipment. They already sold ten old IS machines to 'Geeta Glass' in Firozabad (India), where glass bangle industry is spread all over the place, i.e. with little and no innovation. Here is a place, where old IS machines can be used for modernization of many feasible plants, as also agreed by Mr. Ashoke Charit of 'Prudent Consultancy' (who briefly joined us during our meeting and who was head in Centre for the Development of Glass Industry (CDGI), Firozabad for many years). Their USP is 'total satisfaction of the customers' that is also a viable strategy for many corporates for survival and consolidation, including many glass companies. They seem to have an 'edge' over others in terms of 'flexibility and transparent deals'.

2.4 RCN (Milan, Italy):

This company from Milan (Italy) is specialized in making laminated glasses of different shapes and sizes, and provide technologies and equipment for the purpose. This company was represented by their General Manager: Stefano Ricchi, who made a good presentation within a well-organized stall.

These laminated glasses are mainly used as decoration material (60%) in the reception or

security enclosures in front of any plant. These glasses have 30% application as security glasses. Their business is spread over UK, USA and Argentina. In the machine developed by them, in each 40 min, 9 sq mt of glass can be laminated. This speed is governed by total glass thickness and plastic film quality that is placed in between two glass plates. Their USP is internal fabrication and development at the same time with a possibility of studying project management and its feasibility. As there are not many producers of such laminated glass, the prospect of RCN looks quite bright in the Indian market with a possible angle of diversification in terms of colour and shapes.

2.5 GEDEVELOP (Helsingborg, Sweden):

This small Swedish company, represented by the Mascot Group on the Indian market, is specialized in computerized software related technology for application within the glass container and glass wool manufacturing industries. Their activity comprises the design, development and supply of non-intrusive control and measuring equipment and include three main product lines, specifically:

- GIA Gob Image Analyser with automatic

Gob Weight Control and Gob Measurement Temperature at the hot end area of glass container production.

- GVS Glass Vision System, a unique trend analysis tool for detection of defects on glass containers, again for application at the hot end glass container production.
- GFM Glass Flow Measurement with Glass Flow Control and Glass Flow Temperature Measurement for the glass wool industry.

The entire R & D is an in-house development confirming the technical capability of the company. GEDEVELOP's activities are run from their plant in Helsingborg, Sweden by only 9 people, with turnover of about USD 5 million. Representation is covered by Gerry ter Laak (Director Marketing & Sales) and Miklos Rupp (Manager Glass Container Systems).


The company GEDEVELOP AB with their highly appreciated precision technology should do well in Indian glass plants that are looking for modernization.

2.6 SynergX Technologies Inc. (Montreal, Canada):

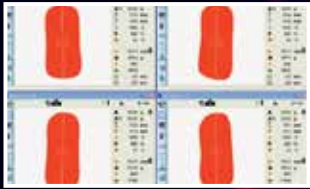
This is a mid-size company, established in 2004

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GVS – Glass Vision System
Hot end trend analysis to support production, independent of glass container temperature.

SEEING IS KNOWING



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near Montreal (Canada), with sales turnover of USD 10 million. Their principal agent is also Mascot Group in India. This company is specialized in making various automatic inspection systems for glass industry with an advantage of 'quality of inspection' involving less number of people. Their USP is 'real time feedback' with smaller cycle time that gives better saleability of their systems and equipment. A basic unit might cost about USD 200,000 with options available at an extra cost. With sensors at 100 points, the precision is the name of the game. They have systems to check the perfectness of a given glass-shape in 3D as well as in 3D metrology with sensors. This company has a great possibility in the future in the glass plants in India.

III. CONCLUSION

It is not possible to visit every "stall", but it was evident from the larger stalls that they were more busy in keeping with their stature rather than maintaining their publicity oriented or customer-promotional attitude. In that sense, the smaller companies were more accessible and they were

easier to talk to on various issues of development that are of great concern to Indian glass industry. Some of these companies have been focused here in a brief manner. It has to be remembered that any exhibition of this style must attract both industrialists as well as technical experts. There are various other experts who could also be involved in deciding on a particular technology or equipment that necessitates capital expenditure. Hence, the organizer would do well in looking after this aspect in their future endeavours.

ACKNOWLEDGEMENTS

As a glass technologist, a meeting with another glass technologist from Czech Republic, Mr. Miroslav Synek, is worth mentioning. Miroslav is a chemical engineer and so rightly fits into the glass industry for a long time in Europe. He visited our AIGMF stall several times during the three days of events, and notably each time, he brought a buyer for our "Directory" which seems to have been liked by many people. I must thank Miroslav for his efforts. ■

Membership of

MEMBERSHIP

Members of the Federation are classified into two categories; manufacturers of Primary Glass articles are enrolled as **Ordinary Members** of the Federation and suppliers to glass industry viz., suppliers of machinery, raw materials, Consultants and others connected with glass industry are enrolled as **Affiliate Members**.

Foreign Companies supplying machinery etc., to glass industry are also enrolled as Affiliate members.

The membership forms can be downloaded from <http://www.aigmf.com/membership.php> Members of the Federation are enrolled on the recommendation of Zonal Associations viz.:

- Western India Glass Manufacturers' Association
- Eastern India Glass Manufacturers' Association
- U.P. Glass Manufacturers' Syndicate
- Northern India Glass Manufacturers' Association and
- South India Glass Manufacturers' Association

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Applicants for enrollment for a period of five years may pay a consolidated amount of ₹ 27,000/- (including admission fee).

AFFILIATE MEMBERS FROM COUNTRIES OTHER THAN INDIA

- i. The admission fee and annual subscription is US \$ 100/- and US \$ 200/- respectively.
- ii. Applicants for enrollment for a period of five years may pay a consolidated amount of US \$ 1000/- (including admission fee). ■

Dr. Devendra Kumar's, Professor, Department of Ceramic Engineering, Indian Institute of Technology, (Banaras Hindu University) visit to Gujarat Guardian Ltd., Float Glass Plant at Ankleshwar, Gujarat

(June 2013)

The All India Glass Manufacturers' Federation (AIGMF) has taken an initiative for closer interaction between academia and industry since 2011. Department of Ceramic Engineering, Indian Institute of Technology (Banaras Hindu University), Varanasi serving the nation for Glass Engineering and Technology Education since 1924, is supporting this initiative of AIGMF. There are regular contributions from scholars from academia to its Magazine "KANCH".

Prof. Devendra Kumar of this Institute and Member Editorial Board "Kanch" is regularly visiting Glass Industries nationwide with the support of AIGMF. In 2012 he visited float glass plant of Asahi India Glass Limited at Roorkee. Later, he visited a few glass manufacturing units of Firozabad Glass Industry Cluster of Uttar Pradesh.



Recently on June 10th, 2013 Prof. Devendra Kumar visited float glass plant of Gujarat Guardian Ltd., at Ankleshwar, Gujarat. Gujarat Guardian Ltd., is a joint venture of Modi Group of Industries and Guardian, U.S.A. The plant takes pride in its safety and house-keeping standards. The plant has a flat management structure which helps in fast decision making and is also very effective in good operation and maintenance of the plant. This plant manufactures



clear float glass with thickness ranging between 2-12 mm and mirror glass. For other applications numerous customers/processors buy their glass and give value addition to 'MODIGUARD' glass.

Mr. Gaurav Raj Chandra, Manager, Production welcomed Prof. Devendra Kumar, showed the plant and described the uniqueness of safety and management system of this plant through which quality and standards are maintained. In the later part of the visit Prof. Devendra Kumar had a meeting with Mr. Gautam Misra, Plant Manager and explored the different possibilities of

Academia-Industry Interaction for mutual benefits, social responsibility and sustainable development. A few areas of glass technology and training were identified through which association of academia and industry under the umbrella of AIGMF could be initiated.

The visit was very pleasant. Prof. Devendra Kumar and Secretariat AIGMF acknowledge with thanks the hospitality and arrangement made by Gujarat Guardian Ltd, Particularly Mr. Himanshu, Mr. Gautam Misra, Mr. Gaurav Raj Chandra, Mr. Ajay Singh and Mr. Tushar. ■

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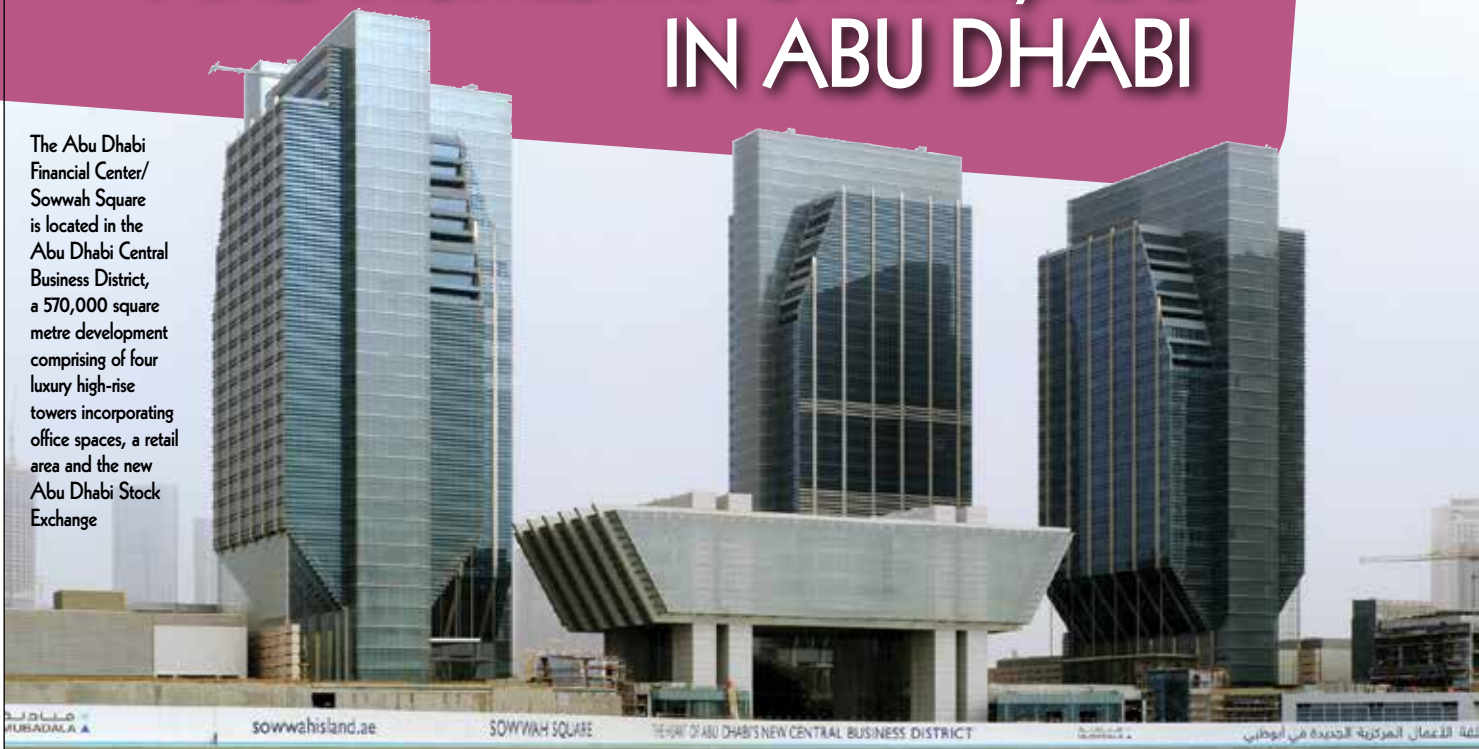
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The Abu Dhabi Financial Center/ Sowwah Square is located in the Abu Dhabi Central Business District, a 570,000 square metre development comprising of four luxury high-rise towers incorporating office spaces, a retail area and the new Abu Dhabi Stock Exchange



The most recent application of DuPont™ SentryGlas is that of a 570,000-square-metre development in the new Abu Dhabi Central Business District. In this article, DuPont explains the reasons behind the use of SentryGlas®, with regards to resistance, performance and post-breakage behaviour.



“

Constructed by German laminator BGT, the laminate glass panels used for the Louvers were decorated with a special silk screen printed, two-colour congruent pattern in order to minimize the G-value. SentryGlas® was selected for its resistance to humidity and high temperatures, as well as its post-breakage behaviour and open edge performance

”

NEW APPLICATION OF SENTRYGLAS

The new façade covering the four Sowwah Square towers in Abu Dhabi provides another example of the functional and structural capabilities of DuPont™ SentryGlas®.

Located in the Emirate of Abu Dhabi, Sowwah Square is part of the Sowwah Island project and is located in the new Abu Dhabi Central Business District, a 570,000



DuPont



square metre development comprising of four luxury high-rise towers incorporating office spaces, a retail area and the new Abu Dhabi Stock Exchange.

THE FAÇADE

Designed by architects Goettsch Partners of Chicago, United States, and manufactured and installed by Folcrá Beach Industrial Company W.L.L and J&H Emirates (Jangho), the façade construction used on the Sowwah Square towers comprises a high performance glazed curtain wall system with external sunshade glass - Louvers.

These Louvers comprise two side-supported open edge glass panels, which are installed horizontally in U-shaped fixation systems. The laminate panels each measure 500 millimetres x 1,000 millimetres, or 300 millimetres x 1,000 millimetres and use 1.52 millimetres SentryGlas interlayer.

Why SentryGlas?

According to the architect, SentryGlas was selected for its resistance to humidity and high temperatures, as well as its superior performance compared to PVB-based alternatives in terms



By deploying laminate panels incorporating DuPont™ SentryGlas®, architects were able to successfully address a number of important structural and functional demands on the Abu Dhabi Financial Center



of post-breakage behaviour and open edge performance. Due to the strength of the interlayer, SentryGlas laminates demonstrate excellent post-glass-

breakage performance. Upon impact, the glass may break, but dangerous fragments will adhere to the SentryGlas interlayer, reducing the risk of injury to people in the vicinity. In addition, SentryGlas

is 100 times stiffer and five times stronger than PVB, which meant the architects were also able to design and specify thinner laminate panels and, as a result, significantly lighter than PVB-based alternatives.

STRUCTURAL AND FUNCTIONAL DEMANDS

By deploying laminate panels incorporating SentryGlas, the architects were able to address a number of important structural and functional demands, one of which was the high daytime temperatures and humidity. The superior performance offered by SentryGlas (which resists temperatures up to 80°C) in regions where high temperatures are common made it an ideal candidate for this project. The building enclosure system was designed and fabricated to allow

for noiseless thermal expansion and contraction caused by an ambient air temperature range of 5°C (low) to 54°C (high), with a nominal temperature of 27°C. Anticipated material surface temperatures due to solar heat gain, or night sky heat loss, were therefore evaluated for selected materials and finish colours and were used in all design calculations.

As Charles W. Wittleder, Senior Associate at Goettsch Partners states: "Although no specific humidity levels were specified for this project, the effects of humidity on exposed edge laminated glass were considered when specifying the use of SentryGlas for the sun shade elements."

"Specifying SentryGlas gave us greater design freedom. It allowed us to leave the glass edges exposed and to confidently design a two-edge captured system, with the glass panel spanning between edge clamps."

GOETTSCH PARTNERS

Goettsch Partners is an innovative architecture firm with a global perspective, emphasizing a singular design approach across offices in Chicago, Shanghai and Abu Dhabi. Focused on combining exceptional design, technical expertise and unmatched service, the firm creates measurable value and environmentally responsible solutions. Services include architecture, interiors, planning and building enclosure design. Diverse projects around the world share a consistent emphasis on bringing bold design clarity to complex challenges.

DESIGN AND MANUFACTURE OF THE CURTAINWALL

Designed and manufactured by German laminator Bischoff Glastechnik AG (BGT), the laminate glass panels used for the Louvers needed to be decorated with a special two-colour congruent silk-screen printed pattern in order to optimize solar gain and reduce solar glare. As Martin Sulzer of BGT explains: "We were chosen as laminator on this project primarily because of our expertise in silk-screen printing of glass laminates. For the Abu Dhabi Financial Center, the glass Louvers have white spots on their outer side glass panels and black spots on their inner side. This two-colour congruent printed decoration minimizes the G-value [solar energy transmittance] allowing less sunlight into the building,

which keeps employees more comfortable on hot days."

"The white colour on the outer edges gives a slightly foggy, frosty appearance on the surface of the glass. The black spots on the inner side of the glass enables the human eye to look through the printed pattern on the glass," adds Sulzer. As well as numerous functional advantages, SentryGlas interlayers provide multiple aesthetic benefits, including high, crystal-clear transparency, virtually universal resistance to yellowing and, last but not least, excellent edge stability; all of which are important to the long-term aesthetic appeal of the building.

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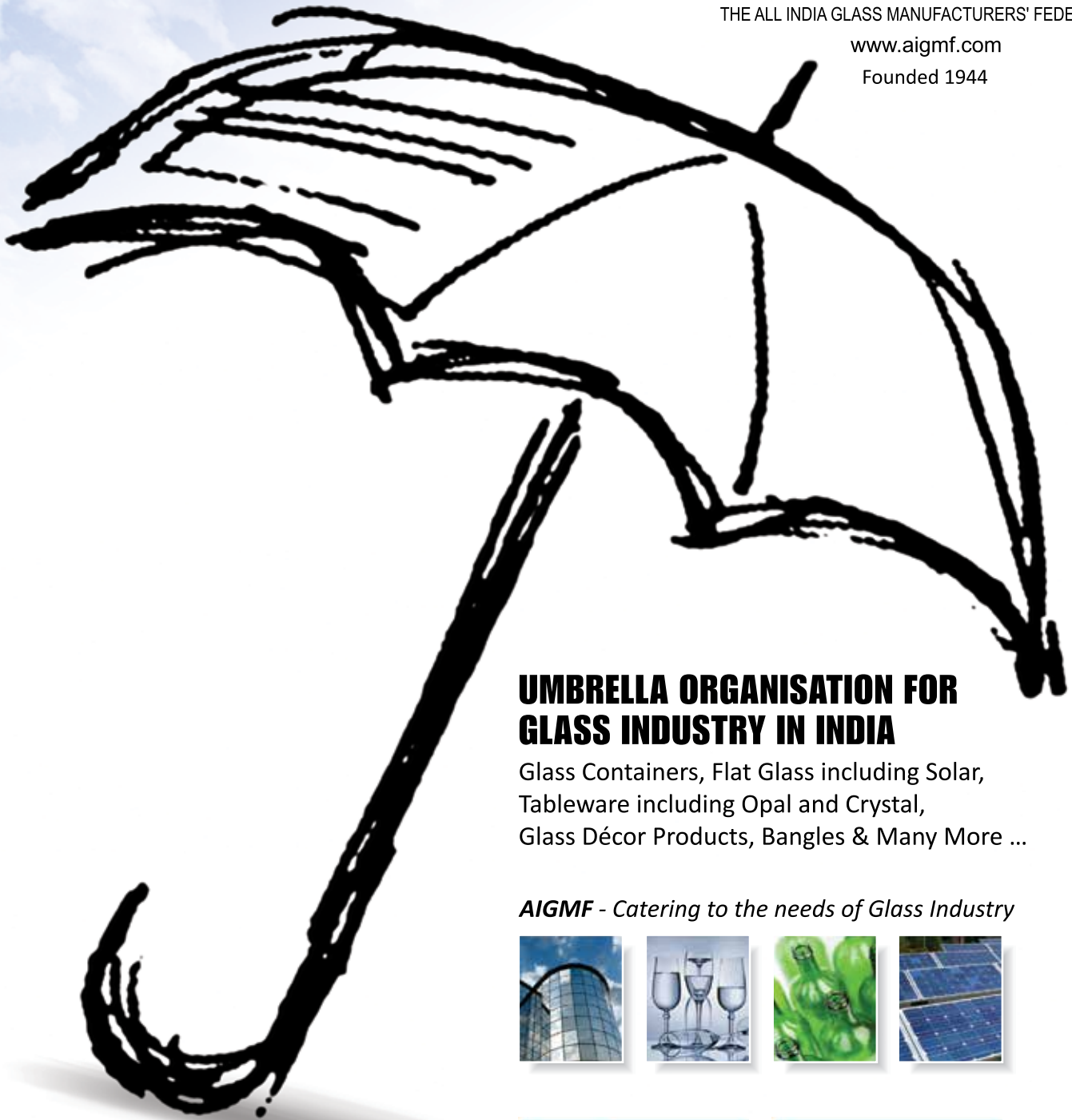




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INTERPANE

Interpane Glas Industrie AG is one of Europe's most important flat glass processors. The company was founded in 1971 by Georg F. Hesselbach and has its headquarters in Lauenförde, Germany, with production at 11 locations throughout Europe, in Germany, Austria, and France. The company's product range includes float glass and low-iron float glass for photovoltaic and solar thermal applications, high-quality coated insulating glass, sound-proofing glass, solar-control glass, safety glass and all-glass doors and panels. Today, the Interpane group comprises production facilities at eleven locations in Germany, Austria, and France.

Brisbane, in the Australian state of Queensland, is now home to an important landmark: the skyscraper "One One One Eagle Street", with its 195 metres, is, in fact, the tallest office building in the city. The building has already received awards for sustainability thanks to the 30,000 square metres of ipasol neutral solar control glass from Interpane, making an important contribution to the building's good CO₂ balance.

B RISSANE AND ITS GLASS FIG TREE

Brisbane is the capital and most populous city in the Australian state of Queensland and the third most populous city in Australia. Brisbane's metropolitan area has a population of 2.15 million, and the South East Queensland urban conurbation, centred on Brisbane, encompasses a population of more than 3 million. The Brisbane central business district stands on the original European settlement and is situated inside a bend of the Brisbane River, approximately 23 kilometres from its mouth at Moreton Bay.

Organic design

With organic design behind a highly transparent structural glazing façade, the skyscraper "One One One Eagle Street" in the heart of Brisbane is a true landmark. At a height of 195 metres it is the tallest office building in the city and stands at an exclusive location in the central business district.

The nature-inspired design was produced by Cox Rayner Architects for the GPT Group: the steel construction, which is visible from the outside, is based on the interwoven appearance of a fig tree trunk. But it is not only the design that is innovative; the building has already received awards for sustainability. The 30,000 square metres of ipasol neutral solar control glass from Interpane make a major contribution to the good CO₂ balance: the glass allows plenty of daylight to enter the building but reduces overheating of the offices by the intensive solar irradiation that is present throughout the year – which sinks air conditioning costs and protects the environment.

Inspiration from nature

Brisbane, characterized by its subtropical climate, has maximum average daily temperatures of more than 25°C and high humidity, and is a paradise for water sports. It is also the home of large-leaved fig trees, which, with their overhanging branches, provide pleasant shade in the city centre. This inspired the architects when they were designing "One One One Eagle Street". The interwoven steel construction can be seen through the particularly colour-neutral ipasol all-glass façade. It is based on the appearance of the fig trees. At night 52,000 veins of LEDs mounted on the steelwork light up the building, and, with pulsating light, give the impression of leaves moving in the crown of a fig tree.

EXCELLENT SUSTAINABLE BUILDING CONCEPT

On a ground area of 1,400 square metres, 64,145 square metres of office space are available for rent. Stylish restaurants and bars can be found on the ground floor. The multi-storey lobby is especially light-flooded due to room-high glazing and appears filigree and transparent. Above it there is a four storey car park for 115 cars and 212 bicycles. Visitors and office workers can reach this level using conventional lifts in the interior of the building. The spectacular alternative starts on the seventh floor – a fully glazed lift that transports its passengers up and down the building façade at a speed

ONE ONE ONE EAGLE STREET

of eight metres per second right up to the 54th floor – with a breathtaking panoramic view all the way up. The building has already been awarded a six-star Green Star Award by the Green Building Council of Australia (GBCA) for its exceptional sustainability. The latest gas-powered generator technology reduces peak loads from the electricity grid, while LED lighting keeps consumption low. A special recycling system reduces waste. However, in the hot climate, the cooling factor plays a critical role. The glass façade greatly reduces air conditioning needs, thus reducing CO₂ emissions: ipasol neutral solar control glass with its excellent solar factor of 27 per cent protects the offices from overheating due to the intensive all-year-round sunshine. At the same time all the 3.1 metre high fully glazed floors get plenty of light because the daylight transmittance (T_v) of the glazing is relatively high. This provides a pleasant working atmosphere and electric lighting only needs to be turned on late in the day.

With its world leading design, ONE ONE ONE Eagle Street has set a new benchmark in innovative office architecture. The building is inspired from the way plants grow upwards, towards the light. A structure of branches binds the building together, giving it an organic nature that echoes the growing canopy in the nearby Fig Tree Plaza. The design of the building allows and offers large, flowing and open spaces for our customers to utilize and enjoy. Surrounding foliage and the ever-changing moods of the river are reflected against the glass exterior which allows abundant natural light and stunning panoramic views throughout and across the Brisbane River and the Story Bridge to the mountains from the East. Located at the heart of Brisbane's exclusive riverfront setting and the Central Business District (CBD), this iconic and modern building is centrally located with a wide range of amenities and services, both within the building and close by as well as being on the door step of the well established Riverside Precinct that offers various places to eat, drink and entertain. ONE ONE ONE Eagle Street is a world-class Premium Grade office tower ideally situated in Brisbane's premier "Golden Triangle" precinct with frontage to the Brisbane River and conveniently located within close proximity to all modes of public transport and retail amenity.

interpane

At night the inner steel construction of "One One One Eagle Street" is illuminated spectacularly by LEDs
Photo: Developer and Owner: "The GPT Group"



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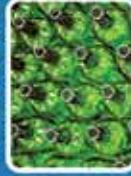


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Synthetic coolants improve the glass grinding process

Dr. Michael Emonds*

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The article which follows looks at the features of modern synthetic (mineral oil free) coolants and explains how they can have a positive influence in the glass grinding process, reducing energy requirements, increasing the durability of diamond tools and improving overall quality and productivity.

Processing glass with diamond tipped tools using only water as a coolant is not sufficient to fulfil today's high productivity and quality demands. The use of water without any additives leads to the following problems in glass grinding:

- rapid decrease in grinding efficiency
- high rate of diamond wear
- plant corrosion
- rapid pH increase of the grinding solution

To find a solution to all of these problems, it is important to take into account the brittle nature of the glass and to consider the process of glass grinding itself. The coolant used to aid the grinding process has to fulfil a number of requirements. For example, there are certain problems due to the small glass fines created in the glass grinding process and their partial dissolution in water. The coolants developed by Aachener Chemische Werke now help to solve these problems. As a result of more than 40 years' experience by ACW in the glass industry, coolants are now available for all types of glass processing, including flat glass, optical glass, crystal and technical glasses.

COOLANT PROPERTIES

The specific properties of ACW – coolants mean that they are able to influence the grinding mechanism itself by lowering the grinding energy needed. In a test with a Bavelloni TB 65 bevelling machine, a 40mm bevel of a 6 mm flat glass was ground at a feed speed of 1m/min (see Fig. 1). The electric current of the first diamond tool was measured as 4,9 ampere [A] when using only water. By adding increasing amounts of coolant, a distinct decrease in the electric power uptake was observed (3,8 A at 5% coolant). This reduction means that the feed speed could be increased by 30 – 50%. Alternatively, a 50 mm bevel was now within reach at the same feed speed.

Furthermore, special additives in the coolants keep the diamond facets of the tool's surface sharp. This helps to prevent a decrease in grinding performance

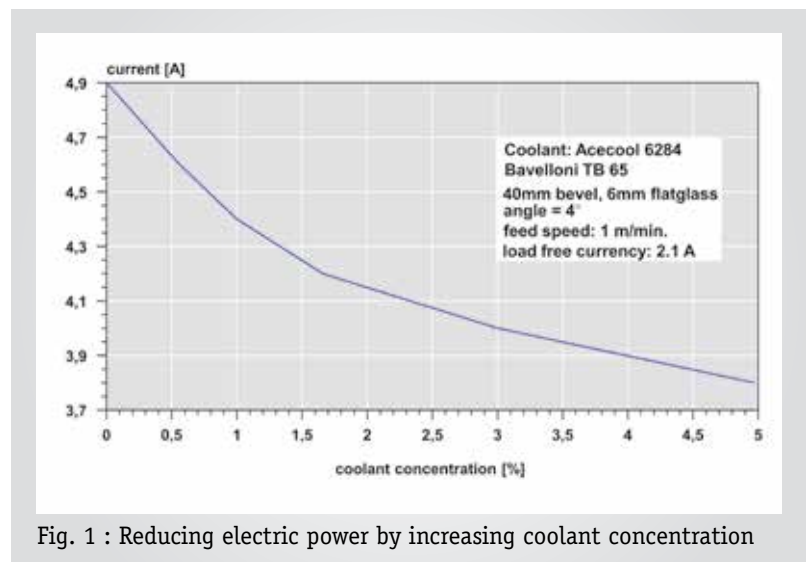


Fig. 1 : Reducing electric power by increasing coolant concentration

and prolonged processing time. Without these additives, the diamond tool has to be redressed periodically to bring new diamonds to the surface of the grinding tool and to remove glass particles. This process increases costs due to:

- dressing and production time
- stresses in the tool, heavily reducing its lifetime

When drilling an 8 mm flat glass with a 35 mm drill at constant pressure and drill speed, the first drill took 40 seconds (freshly dressed drill, see Fig. 2). If only water had been used as a coolant, after five drills the drilling time was 900 seconds and the drill had to be redressed. Adding 5% of coolant allowed 15 drills without redressing. At a coolant concentration of 10% a constant drilling time of around 100 seconds was observed. Within 50 drills, no dressing was needed.

The following benefits for the user result:

- the processing speed can be increased
- the diamond tool is saved, its lifetime is prolonged
- the precision of the diamond tool is preserved for a longer time
- surface and edge quality of the worked piece are improved (especially when sawing or drilling)
- the redressing intervals are prolonged, reducing dressing and production downtime
- increase in productivity

The choice of the coolant mainly depends on the very special demands of the process. The more glass that has to be ground or the higher the speed required, the more efficient the coolant has to be. This especially holds true when grinding optical

glass with very fine diamond tools. The grinding performance of these tools rapidly decreases when using a coolant that is not designed for the task. This research shows that an increase in the concentration of the coolant will normally improve the grinding performance. The additional costs for the coolant are often more than equalised by the increase in productivity.

ADDITIONAL FEATURES

In addition to their special effects concerning the grinding process itself, coolants also have to take care of the special properties of the fine glass powder produced by the grinding process:

- keeping the glass sludge soft

As many users know, after a short time the glass sludge becomes firm like concrete. This is caused by a reaction on the surface of the glass fines which makes them stick to each other. This is followed by mineralisation where stone like, pink coloured sediment forms at the bottom of the coolant tank. This sediment is difficult to be removed and there is always the danger of destroying the sump tank.

This sedimentation process is suppressed by use of ACW - coolants. As they exhibit good cleaning properties, sedimentation inside the machines is prevented, making maintenance much easier.

- buffering

Every time flat glass is ground, sodium ions are leached into the water. This results in an increase of the pH value (up to 11 - 12 can be observed) which may cause severe skin irritation. Due to their buffering features, ACW - coolants bind all alkali thus keeping the pH value within an optimal range for a long time. The buffer capacity is proportional to the coolant's concentration.

- non hazardous

All ACW - coolants meet the requirements of the German TRGS 611 (contents of free and bound secondary amines must be below 0.2%). According to their composition, they do not contain mineral oil, mineral oil ester, chlorinated and fluorinated hydrocarbons, PCB/PCT, nitrite, formaldehyde, chlorine, phenol, p-tert.-butyl benzoic acid or heavy metals.

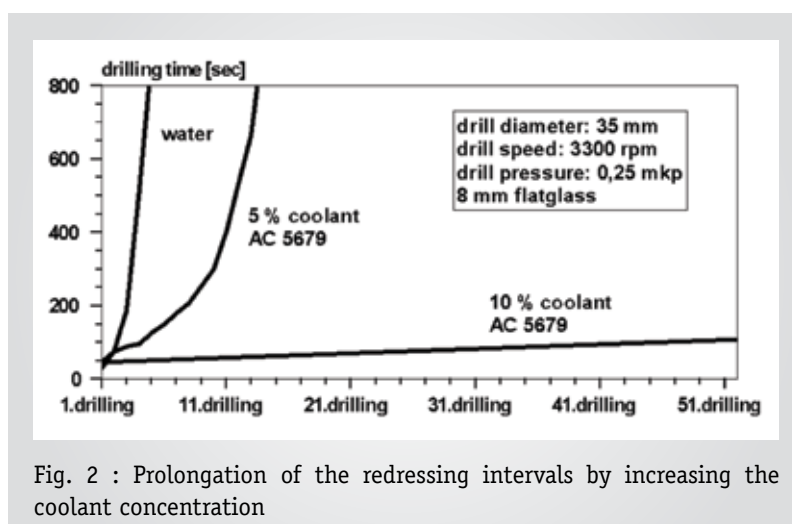


Fig. 2 : Prolongation of the redressing intervals by increasing the coolant concentration

- anti-corrosive

At the recommended minimum concentration of 2 %, ACW - coolants protect both tools and machinery parts (copper and ferrous metals, bronze) from corrosion.

- antibacterial

For skin protection care reasons, no biocides (germ killing agents) are added to the coolants. Nevertheless, by a good maintenance of the coolant solution specific compounds of the coolant hinder micro-organism (bacteria, yeast, fungi, algae) from growing.

The coolant solution is clear, which is particularly important in manual alignment operations such as drilling or edge working as any markings

on the glass can be seen through the coolant. They are delivered as coloured or non-coloured (N-version).

CONCLUSION

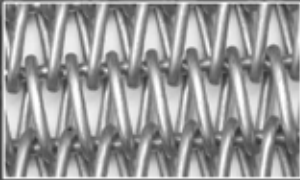
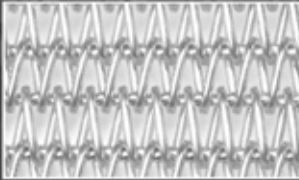
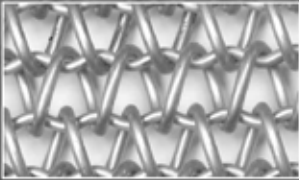
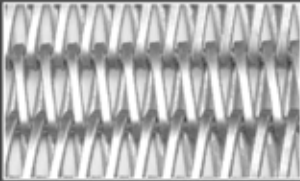
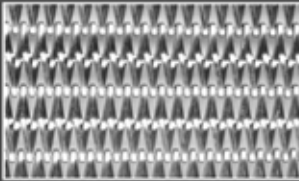
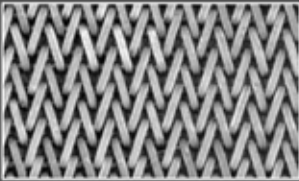
In the glass processing industry, the demands in productivity and quality are steadily growing. Attempts to improve the glass grinding (and drilling or sawing) process therefore have to take into account the interactions of the three elements of this process: the tool, the worked piece and – between these two – the coolant system. While in the past the contribution of the coolant system was regarded as more or less secondary, nowadays research work more and more emphasises the importance of the coolant. ■

Introduction of Company Profile in Kanch

A special feature - Company Profile has been introduced in Kanch. This will contain interview of Managing Director/Proprietor of the company or their nominee by an expert and will be published in KANCH along with photograph of the person interviewed as also the factory.

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TYPE L.K.16 FLAT SPECIFICATION 36-22-3 X 1.75-12 (LEHR BELT)	TYPE L.K. 5 FLAT SPECIFICATION : 60-40-2 X 1-16 (I. S. MACHINE)	TYPE CB2 FLAT SPECIFICATION 48-80-1.6 / 0.7-16 (I. S. MACHINE)

— R. D. Ashar Pvt. Ltd. —
 (Formerly R D Ashar Engg Div.)
 R. D. Ashar Compound, Main Road, Wagle Estate, Thane - 400 604, Maharashtra, INDIA Tel. : +91-22-2582 3739 (Hunting Line)
 Fax : +91-22- 2582 0864 E-mail : rdashar@vsnl.net OR rdashar@mtnl.net.in Website : www.rdashar.com



Mr. M.D. Farooq
(Founder)

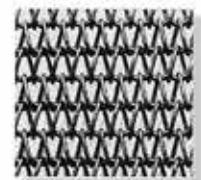
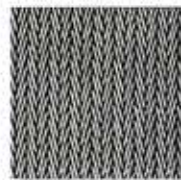
Manufacturer Of Energy
Efficient Lehrs



Mr. M.D. Farooq, the founder of Umda Engineering, brings to the table more than 35 years of expertise in the manufacturing industry. Starting from humble beginnings, today more than 350 of Mr. Farooq's Lehr machines are successfully installed around the world.

Mr. Farooq is best recognised as one of the co-founders of TNF Engineering, a company known across the industry as not only the leading manufacturers of Metallic Wire Conveyor and Lehr belts but also of Glass Plant Equipment. This mantle of superior performance and expertise has now been passed on to Umda Engineering.

Belts



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Glass Technology Services

(Helping you make your mark in glass)

GLASS TECHNOLOGY SPECIALISTS INVEST OVER £500K TO MEET INDUSTRY DEMAND

Independent research, test and design specialist Glass Technology Services Ltd (GTS) has completed a £500K investment programme to meet increasing demand throughout the glass supply-chain.

The two-year programme has seen GTS invest in new plant, equipment, people and training in order to remain at the forefront of research, product development, quality and performance testing, failure investigation and issue resolution for their growing client base across the world.

GTS Commercial Director, Malcolm Glendenning, comments: "We have grown our team of specialists by more than 25% - recruiting material sciences, physics, chemistry and mechanical engineering graduates, established industry specialists as well as apprentices to work alongside our leading technical experts, who have some 380 years' combined experience in the industry.

"Coupled with investment in the latest technology and infrastructure, it means we're better equipped to provide vital solutions to manufacturing issues and make recommendations on how to improve product performance as well as to meet any legislative requirements and quality standards. We also recognise that for many clients, speed is of the essence and many of the services we provide can now be offered on the same or next day."

The specialist team has also recently expanded its flat, automotive and architectural glass services with the appointment of flat glass specialist, Garry Smith. With more than 25 years' industry experience Garry will provide invaluable technical expertise across all areas of flat glass manufacture, performance and use, including the latest standards, specifications and regulations.

The latest investments allow GTS to extend its fragment analysis services beyond glass - to include plastics, metals and both manufactured and naturally occurring minerals, expanding on the foreign body identification and fragment analysis services already provided across the food and drinks, retail, pharmaceutical and glass sectors.



The team also evaluates thermal, solar and mechanical performance of glazing for quality and performance testing and analyses composition, pharmacopoeia and food contact durability to ensure that all appropriate regional or international standards are met for their clients.

These latest investments have led to major consultancy and project commissions, including an assessment of the existing and potential glass recycling infrastructure in the Russian Federation and collaborations with leading universities and businesses to develop new coatings for glass products and innovative compositional development for specialist applications across biomaterials, photonics and optical devices.

GTS has been awarded numerous grants to develop new products, including the development of specialist fibres used for the treatment of bone trauma, eye-safe laser imaging sensors for long-range operation, 3D printing and specialist bio-compatible glasses for biological implants.

GTS works with global manufacturers, processors and manipulators, fillers, brand owners, retailers, architects, building contractors and consulting engineers across Europe, the Middle East, Asia, America, China, Australia and Africa, to ensure that their products meet all the required and pending standards for export across the world as well as meeting regional legislative requirements.

SUPPLY CHAIN LOOK TO GLASS INDUSTRY TO MEET NEW CE MARKING REGULATIONS, SAYS SPECIALIST

Glass Technology Services Ltd (GTS) has achieved Notified Testing Laboratory status for CE Marking glass construction products.

The independent testing specialist is one of only a few providers in this sector to hold the accreditation, which means it can work with glass manufacturers, tougheners, laminators and processors across the supply chain to provide Initial Type Testing (ITT) under the new Construction Products Regulation (CPR, Regulation (EU) 305/2011) which became compulsory on July 1st 2013.



GTS Technical Director Dr. Nick Kirk said: “The CPR has now fully replaced the Construction Products Directive (CPD, Council Directive 89/106/EEC) and means that glass used in construction or road markings within the European Economic Area, must now be performance assessed (initial type tested) by a legally and technically independent notified testing laboratory.

“It is enforceable across the European Union and applies to all construction products that are covered by a harmonised European Standard (hEN). Previously, manufacturers and processors were able to self-certify or simply opt out, but now legal action can be taken against manufacturers, their agents and notified bodies if a product does not have the appropriate declaration of conformity for its intended use and the CE mark.”

How CE marking will be applied and who will police it is still a matter of debate in the industry. Garry Smith, GTS Principal Consultant, adds:

“The aim of the CPR is to level the playing field. Many global manufacturers have been CE marking since the European Standards were set two years ago, but others are catching up to meet this summer’s deadline.

“Every time a product is sold (placed on the market) to an end user, or a customer in the supply chain, the product must have the relevant CE documentation when the product is the subject of a hEN.”

GTS is a Notified Body (number 2461) under the CPR for Initial Type Testing (ITT) of glass construction products under Attestation of Conformity (AoC) System 3. The independent specialists assess pendulum body impact resistance, thermal properties, radiation properties and a range of other performance characteristics of glass in accordance with European Norms (EN 12600, EN 410, EN 673 and EN 12898).

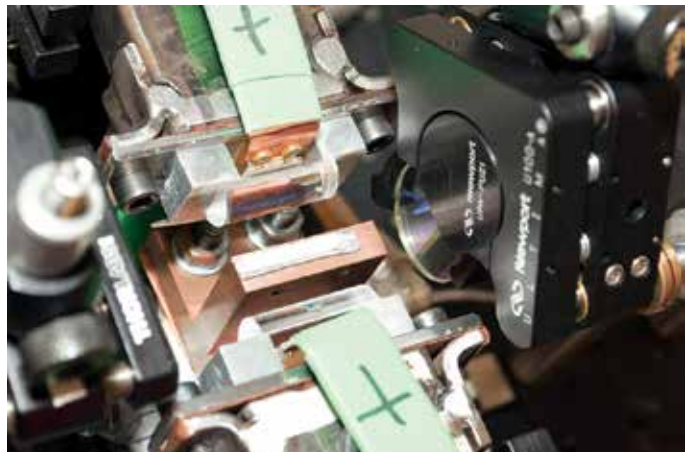
Working across the glass supply chain providing laboratory and on-site testing and analysis for glass manufacturers, processors and manipulators, fillers, brand owners, retailers, architects, building contractors and consulting engineers, GTS has an international client base drawn from a wide range of markets including architectural, automotive, food and drink, pharmaceutical and technical, defence, photonics and biomedical.

EXPERT GLASS PARTNERSHIP SECURES LASER INNOVATION GRANT

Glass Technology Services Ltd (GTS) is providing photonics and material science expertise to a development project on laser illuminated eye-safe sensors, which has been awarded a grant from the UK’s innovation agency, the Technology Strategy Board, to forward advances in technology and innovation.

Led by Thales UK’s Optronics business in Glasgow, the Light-MiLES (Miniature Laser-illuminated Eye-safe Sensors) project will develop and demonstrate an innovative, compact, low cost and eye-safe laser-illuminated imaging sensor, capable of long-range operation. Other partners in the specialist consortium include Gooch & Housego Ltd and the University of Leeds.

The technology has far reaching applications, especially where human exposure is unavoidable – and could include applications such as optical communications, medical diagnostic use, remote sensing (LIDAR), range finding and targeting across defence, medical, construction, domestic and commercial markets. In partnership with the University of Leeds, GTS will be developing new, ultra-high quality, glass materials for use within the laser cavity of the sensor which will enable significant reduction in



the energy requirement and weight of the final product.

The government backed Technology Strategy Board grant is part of a new £20 million government investment, which seeks to stimulate innovation in five key enabling technologies including advanced materials and photonics.

Dr. Nick Kirk, Technical Director of Glass Technology Services Ltd, said: "We're delighted to be part of this project team. The partners will be exploiting state of the art technologies in material science, advanced manufacture, photonics and

sensor systems to develop these innovative products."

David Jackson, Product Manager for Thales UK's Optronics Business said "GTS bring a world-class laser glass development capability to the Light-MiLES consortium and perfectly complement the imaging systems, optical packaging and laser ranging know-how provided by the other partners. Together this collective expertise will ensure that Light-MiLES reaches its goals and brings a step-change in laser illuminated eye-safe sensors capability to the market."

LEADING GLASS RESEARCH FACILITY AWARDED GRANT TO PROGRESS BIOMEDICAL PHOSPHATE-FIBRES

Glass Technology Services Ltd (GTS) has been awarded a grant by the UK's innovation agency, the Technology Strategy Board, to forward advances in technology and innovation.

The grant is part of a new £20 million government investment through the Technology Strategy Board which seeks to stimulate innovation in five key enabling technologies, including advanced materials and photonics.

The development will include a working prototype production facility to pave the way for industrial manufacture of phosphate fibre tows. These specialist fibres can be used for a multitude of biomedical applications, including the treatment of serious bone trauma.

The production facility aims to produce phosphate fibres in a form that can be used to produce both fabrics and reinforced plastics allowing a range of clinical uses. The materials produced from these

phosphate fibres stimulate cell growth and are eventually replaced by cells such as bone or skin due to their unique ability to dissolve in body fluid.

Dr. Nick Kirk, Technical Director of Glass Technology Services Ltd, said: "Developing new technologies is crucial to advancing our understanding and capabilities in material science. This grant will enable us to develop a prototype production facility and new glass compositions and apply them in new and innovative ways.

"We are very proud to be leading this research and development project and it is encouraging to see the Technology Strategy Board acknowledging the importance of glass in modern technology. These government grants are an excellent way to help stimulate growth, research and development in UK manufacture and technology."

Other partners in the project include The University of Nottingham, Controls Interface Ltd, Invensys-Eurotherm and P-D Interglas Technologies.



RAPID FOREIGN BODY ANALYSIS

Rapid test techniques are enabling food and drink manufacturers to achieve vital 24-hour turnaround on analysis of contaminants – glass and other fragments – found in their products.

In a recent test programme, independent experts Glass Technology Services Ltd (GTS) found that 70% of fragments, which had been found in products by consumers and submitted for analysis, had originated from items commonly found in the home, such as measuring jugs, mixing bowls and jars and of the remaining 30%, nearly all could not have been introduced in the food manufacturing process.



“Accuracy and speed are clearly vital with these kinds of analyses,” said Andrew Broadhurst, GTS Development Technologist and former analyst with the Forensic Science Service. “Food manufacturers know the potentially devastating impact of customers finding foreign objects in their food and drink – when that object is thought to be a glass fragment, the ramifications are obvious.

“That’s why we have been investing heavily in our fragment analysis service, both for glass and non-glass samples, enabling us to identify the most likely source of stray glass or other material and – most importantly – exclude potential sources. In the majority of cases submitted to us, contamination by the manufacturer is not the most logical explanation, even when glass packaging is used. Results can be issued electronically within 24 hours of receiving the sample and depending on the urgency within a few hours.”

Composition alone was not enough to determine the source of an object as a wide variety of items could be made from the same kind of glass, Andrew added. The laboratory also looked at how the original article was manufactured and how it failed, in other words how the fragment was formed and what happened to it after the chip, crack or breakage. If potential sources of the fragment were available, the team could match or exclude in order to narrow down the options.

“In many cases we have been able to help manufacturers avoid product recalls as well as of course protect their vital brand reputation,” said Andrew.

In the recent test programme, GTS used a random selection of 125 samples sent to them for fragment analysis. The findings showed:

- 32% were borosilicate based glass: typical for cookware and glassware made to withstand high temperatures and most likely to have been inadvertently introduced by the customer during cooking, from measuring jugs or casserole dishes
- 38% were clear soda-lime-silica based glass: a common glass composition used for a wide range of products, including jars, bottles or mixing bowls, commonly found in the home
- 30% were from other sources including lead crystal items, green soda-lime-silica container glass and flat glass, but the majority from non-glass sources, including naturally occurring salt. In one case, they even found a piece of tooth that belonged to the complainant

GTS laboratories employ a range of analytical techniques to determine fragment identity – using technology widely used in forensics, including:

- SEM-EDS (Scanning Electron Microscopy - Energy-Dispersive X-ray Spectroscopy) - measures the chemical composition of each sample, while allowing surface features to be examined at very high magnification
- GRIM (Glass Refractive Index Measurement) – combined with potential sources, provides strong

evidence for product matching

- FTIR (Fourier Transform Infra-Red) Spectroscopy – provides valuable information about molecular structure, particularly useful for plastics/polymers

“Combining these techniques and our unique understanding of glass composition, forming and failure, we’re able to assess a range of vital clues and provide clients with a comprehensive report on a sample’s properties and likely source,” said Andrew.

GLASS FORENSICS BEATING THE COUNTERFEITERS

Forensic experts at Glass Technology Services Ltd (GTS) are helping manufacturers, brand owners, food and drink, fragrance and beauty companies to beat the counterfeiters.

The glass research and analysis specialists are taking an innovative approach using methods such as refractive index measurement and spectroscopy, used extensively in forensic science laboratories, to support brand owners, authorities and other stakeholders in identifying counterfeit products such as perfumes, cosmetics and spirits.

Glass Refractive Index Measurement (GRIM3), Fourier Transform Infra-Red spectroscopy (FTIR) and Wavelength Dispersive Spectroscopy X-Ray Fluorescence (WDS-XRF) equipment is being utilised to analyse both glass and plastic packaging - thought to be at a fraction of the time and cost of analysing the high value counterfeit products themselves.

GTS Development Technologist Andrew Broadhurst, who previously worked with the Forensic Science Service, said: “The time and cost of laboratory analysis for premium spirits or prestige perfume and skincare products, for example, can be substantial. It can be a much quicker and more cost-effective process to spot a fake by analysing key differences between genuine and ‘suspect’ packaging.

“If the container is a fake, it is almost certain that the product will also be counterfeit.”

“Using GRIM3 equipment, we can very precisely determine whether the refractive index of glass matches that of the claimed manufacturer and the batch it came from. Counterfeiters simply cannot replicate glass composition - even if it looks exactly the same or uses exactly the same ratio of raw materials. Glasses that appear the same, but are made from different raw materials, have unique chemical element markers – akin to finger-prints or DNA – and this alone, in some cases, can give a definitive answer as to whether the glass is from the genuine source.

“Our WDS-XRF and GRIM processes provide even greater detail with which to compare composition - giving vital evidence to manufacturers and brand owners pursuing claims against suspected fraudsters.”

GTS experts have also worked on major research projects to develop anti-counterfeiting products for the glass market, including invisible inks, micro-chipping and specialist markers. One key avenue that could be explored, with sufficient support from brand owners and manufacturers, would be the establishment of a database to fingerprint the exact characteristics of all genuine suppliers, monitoring variations in batch production – allowing an item to be compared to the claimed production time and manufacturer. ■

Glass Technology Services Ltd., provides analysis, consultancy, testing and research and development support across the glass, automotive, food and drink, construction, retail, medical, pharmaceutical, security, defence and biotech sectors across the UK and internationally.

GTS prides itself on its confidentiality and independence and is accredited to ISO 9001, 14001 and 17025 standards.

For more information please visit www.glass-ts.com, email info@glass-ts.com or telephone +44 (0) 114 290 1801



Glass collection and recycling in Italy

According to Massimiliano Avella, analyses conducted in Italy confirm a deterioration in the quality of local furnace ready cullet following the introduction of separate collection systems, using operational procedures that are far from the ideal of 'mono material' collection in bottle banks.

Consorzio Recupero Vetro (COREVE) was founded in October 1997 by Italy's leading glass companies pursuant to articles 38 and 40 of Legislative Decree No 22/97, as amended by Legislative Decree No 152 of 3 April 2006 (Italian Environmental Law, 'TUA'), implementing Directive 94/62/EC.

Packaging producers and users are responsible for the correct and effective environmental management of glass packaging waste and have to meet packaging waste recycling targets set by the compliance laws. They may comply with the obligations set out in the TUA either individually or by joining COREVE, which has 85 member companies, comprising 33 packaging producers and 52 importers of empty packaging. COREVE promotes, rationalises, organises and ensures the recycling of all glass packaging waste originated by urban selective waste collection, pursuant of National Preventing Programmes set forth by the National Packaging Consortium (Consorzio Nazionale Imballaggi, 'CONAI') and by the same COREVE pursuant to the TUA. By implementing the TUA, COREVE has signed for the period 2009–2013 a national framework agreement with the National Association of Italian Municipalities (ANCI) in order to guarantee the recycling of all glass packaging waste collected by municipalities (or by waste managing operators entrusted by the latter) and the payment to Municipalities/waste managing operators of an economic amount depending – inter alia – on the waste qualitative level to cover the collection costs. Figure 1 shows the financial and material streams of COREVE's compliance scheme.

Table 1 and Table 2 show the acceptance criteria of waste glass packaging from selective collection (applied by COREVE).

RECYCLING RESULTS

In 2011, the quantity of glass packaging waste of national origin recycled in Italian glass manufacturing plants (closed loop recycling) and in secondary end market applications (open loop recycling), has been estimated at 1,570,000 tonnes, equal to 69.9% of the 2,245,000 tonnes introduced to the consumer market and compared to a total of 2,052,000 tonnes of glass recycled by Italian glass packaging manufacturers. During the year, over 223,000 tonnes of cullet was imported, while the amount exported was minimal, so the overall amount of cullet of national origin recycled was around 1,829,000 tonnes.

To summarise the above, COREVE associated glass

manufacturing companies have recycled 1,829,000 tonnes of national furnace-ready cullet (packaging and non), of which 1,548,000 tonnes was made up of packaging waste. Concerning the origin of this waste packaging, it is estimated that at least 29,000 tonnes come from commerce and industry and the remaining 1,532,000 tonnes from household glass separate collection. That considered, due to the low quality of packaging waste collected, during the treatment process of the raw glass, necessary to obtain furnace-ready cullet there is an average process loss of about 15.5%, the total quantity of raw material coming from urban separate glass collection is about 1,682,000 tonnes. Comparing 2011 with the previous year, waste glass packaging delivered from household (public) collection systems has grown by 6%. In the period 1998–2011, the total quantity of glass recycled (packaging and non)

has increased by 41%, while recycled glass packaging waste has risen by 122% in the same period.

AGREEMENT WITH MUNICIPALITIES

According to the National Framework Agreement ('Accordo Quadro') made between CONAI and ANCI (period 2009–2013), COREVE undersigns two types of agreements with Italian municipalities or with their 'delegated' (entrusted) collection service operators, in order to assure glass packaging recycling.

The first type of agreement (type 1) foresees the delivery by the municipalities or by the delegated operators of the household packaging waste coming from the collection 'as is'. This raw cullet is delivered to COREVE, who guarantees the recycling by taking charge of the material from municipalities (paid for by COREVE) and making calls for tenders, attended by glass recycling companies (who have already signed

Category	'Fine' fraction limits (% in weight and size)	Maximum impurities (% in weight)	Amount paid for raw cullet (€/tonne)
Excellence	Fine fraction (size <15mm) maximum 5%	Overall impurities: Maximum 1%, of which KSP: Average 0.2% - maximum 0.3%	37.00 + 0.50 ⁽¹⁾
First class	Fine fraction (size <10mm) maximum 5%	Overall impurities: Maximum 3%, of which non-packaging wastes (metals and glass) and KSP allowed; maximum 1.5% (KSP: Average 0.2% - maximum 0.4%)	34.00 + 0.50 ⁽¹⁾
Second class	Fine fraction (size <10mm) maximum 7%	Non-packaging overall impurities: 2.5%; metals (not packaging) maximum 1.5%; KSP: Average 0.2%	17.75 + 0.50 ⁽¹⁾
Third class	Fine fraction (size <10mm) maximum 8%	Non-packaging overall impurities: 5%; metals (not packaging) maximum 1.5%; KSP: Average 0.2%	0.50 + 0.00

Table 1: Technical specifications for 'raw' glass, part one. (1) The amount of €/0.5 tonnes is used by a national COREVE/ANCI research fund to support the best projects made by municipalities to improve the quality and quantity of glass collection and recycling systems.

Flint glass (cullet) sorted by colour	Mixed colour glass cullet maximum content (in weight) 3%	Amount to add €5/tonne
	Mixed colour glass cullet maximum content (in weight) 1%	Amount to add €10/tonne

Table 2: Technical specifications for 'raw' glass sorted by colour, part two.

appropriate agreements with the cullet processing firms to transform it into furnace-ready cullet for glass manufacturing plants or in other secondary raw material for different industrial sectors) under the duty of demonstrating and certifying the recycling process.

The second type of agreement, type 2, is stipulated/signed exclusively with the delegated (entrusted) collection operators, who are also cullet processors. In these cases, the delivered material to COREVE is already furnace-ready cullet. Overall, through the local agreements in Italy COREVE has taken delivery of 1,327,000 tonnes of waste glass packaging, divided as follows:

- 1,005,000 tonnes under agreement type 1 (regarding raw glass);
- 322,000 tonnes under agreement type 2 (regarding furnace-ready cullet).

Taking into account the agreements signed/stipulated in recent past years and still in place, currently COREVE directly manages the recycling of glass packaging waste collected from 6083 municipalities (75% of the total), involving about 50,140,000 inhabitants, which is equivalent to 84% of the Italian population.

OPERATING METHODS

The selective collection services should maximise the quantity and quality of glass packaging waste, ensuring closed loop recycling in order to achieve the best results in terms of overall economic, material and environmental benefits. An efficient glass collection and recycling scheme is an important driver to move towards a circular economy, where waste is not dumped but becomes the essential raw material used to manufacture new products.

This aim should be the main goal and criteria to select the best operative methods of household glass collection. Contaminants (unwanted materials present in cullet), can be classified into two groups:

- Non-glass material components as metals, ceramics, stones and porcelain (KSP), glass ceramics (pyro-ceramics or vitro-ceramics), organics (food, strapping, plastic, wood, textiles) and hazardous materials contained in bottles and jars (medical and chemical refuse).
- Glass material components – non-soda-lime glasses including domestic lead crystal and special borosilicate glasses originating, for example, from light bulbs and tubes.

To increase the quantity and above all, the quality of cullet available for recycling from Italy's separate packaging waste collection (post-consumer glass), the best method involves mono-material glass collection using bottle banks. This is the simplest, less costly and most effective system to obtain acceptable quality at the collection stage that is suitable for the technological needs of the subsequent treatment/reprocessing and recycling steps, a basic requirement to increase the quantities recycled.

Table 3 lists the technical specifications for furnace-ready cullet in Italy, either when cullet ceases to be waste by national law and/or when it fits industrial needs.

The raw glass (on packaging waste) analyses carried out in Italy together with local collection operators over the past 12 years have consistently confirmed that the quality of glass collected worsens as more variations are made to the ideal method. Impurities increase going from a mono-material collection system to one in which two or more material types (glass, metals and plastics) are collected together in the same container, such as going from bottle banks to household bins used for so-called 'door-to-door' collection.

Collection system	Presence of contaminants according to the national framework agreement ANCI-CONAI (as % by weight of total collected)		Rejects during the selection/treatment process as % by weight of total waste collected	
	Total	Glass percentage	Total	Glass percentage
Bottle banks	1.75%	5.8%	4.05%	4.05%
Kerbside containers for glass and metal	4.45%	12%	7.55%	7.55%
Door-to-door bins for glass and metal	9.9%	28.6%	18.7%	18.7%
Roadside containers for glass, metal and plastic	27.2%	52.8%	25.6%	25.6%

Table 5: Contaminants and cullet rejected according to collection system.



Figure 1: The Conai/COREVE's management system.

In the cullet treatment/reprocessing plant, a scrap is then produced, made up of non-glass fractions (contaminants) plus glass that is lost during the selection process. The quantity of this scrap depends on the quality of raw glass fed into the sorting treatment plant.

In 2011, compared to the 1,682,000 tonnes of glass packaging waste collected (both in urban and private areas), as a direct result of the diffusion of inefficient collection systems, about 252,000 tonnes of treatment scrap was produced by reprocessing the raw glass to obtain furnace-ready cullet for the glass container industry.

Since 2007, secondary treatment on these scraps has been introduced in Italy. This process is performed by removing organic pollutants with lime washing or a thermal process and milling the cullet under 1mm in size to be able to recycle these types of cullet as well, roughly composed of 'fine' fractions (about 30% by weight) and glass rejected by KSP selection facilities (70% by weight). Thanks to this type of secondary treatment, both in closed and open loop, from the total amount of cullet scraps, more than 122,000 tonnes has been recovered and recycled as 'glassy sand' in the glass packaging industry and about 23,000 tonnes has been recycled as 'ceramic sand' in others industrial sectors, instead of resorting to landfill disposal.

	By Italian law (ex DM 5.2.98)	By Italian glass packaging industry
Glass	99.86%	98.93%
Ferrous metals	<0.002%	0.00%
Non-ferrous metals	<0.01%	0.00%
Ceramics and porcelain	<0.01%	0.01%
Stones	<0.02%	0.01%
Organics	<0.1%	0.05%

Table 3: Technical specifications for furnace-ready cullet (mixed colours) in Italy.

Origin	Quantity of glass (% by weight)
Scrap derived from mechanically separating metals	30%-50%
Scrap derived from separating waste	50%
KSP machined scrap	<90%

Table 4: Quantity of glass in rejected waste.

Separately collected fraction systems	Serviceable glass in % of total glass collected
Bottle banks	96%
Kerbside containers for glass and metal	92%
Door-to-door bins for glass and metal	79%
Roadside containers for glass, metal and plastic	65%

Table 6: Furnace-ready cullet yield (in %) of total weight of glass collected.

Year	Recycling objective (%)	National consumer market (tonnes)	Objective (tonnes)
2012	71.0%	2,206,000	1,570,000
2013	71.6%	2,196,000	1,570,000

Table 7: Glass recycling objectives (2012-2013).

COMPARATIVE SYSTEMS ANALYSIS

Enhancing the 'raw' glass waste after collection and transport to reprocessing facilities produces factory scrap cullet (rejects) within glass treatment plants. The sorting equipment at treatment plants, even though very sophisticated, is never totally selective and tends to reject glass together with the other materials or contaminants present in the 'raw' cullet coming from the collection. As a general rule, the average composition of factory cullet scrap/reject is as that described in Table 4.

Therefore, it can be seen that glass makes up the greater part of scrap produced in treatment/sorting plants. Therefore, it can be said, for example, that for each unit of metal or waste delivered together with glass, the same quantity of glass is lost (ie enhancement is not possible). More important is the glass lost due to improper delivery of ceramic material; at least nine units of glass are rejected for each unit of ceramic material rejected by the optical equipment selecting opaque bodies.

This is why the production of glass waste, derived from recycling operations on cullet coming from urban waste collection and representing 7-10% in weight of the material entering the plant in the past, has been registering a continual progressive increase over the last 20 years. Today, it represents some 15.5%, by weight of the quantities delivered to treatment centres. This cullet, unsuitable for glassworks, is made up of 'fine' fractions (about 30% in weight), with less than 10mm-15mm diameter size, contaminated by ceramic granules and characterised by a high degree of organic pollutants and coarser scrap, derived from selection by machines with optical readouts that reject ceramic materials (for the

remaining 70%).

From a quality perspective, the cullet collected by mono-material collection systems gives results that make it generally suitable for the technological needs of the recycling industry. Conversely, huge problems have been encountered to reach furnace-ready cullet technical specifications with material coming from other forms of separate collection, such as multi-material systems that necessarily require material 'pre-sorting' before delivery to COREVE. The 'pre-sorting' process is normally carried out following the principle of 'extracting' other packaging materials from glass; this means that the pre-sorted glass remains contaminated by foreign materials (general waste, ceramics etc) not rejected during the selection process. To make matters worse, due to the numerous handling phases that the cullet undergoes, the glass is broken, thereby significantly increasing the 'fine' fractions that cannot be recovered and is sent to landfills or requires secondary treatment to recover these scraps.

With 'raw' glass that has undergone a pre-sorting process, COREVE has found that glassy scraps are often produced with higher than 30% by weight of the material input. Commodity analyses carried out together with local waste collection operators over the years confirm that each separate collection system has its own peculiar quantity of impurities and scrap.

In particular, it can be stated that:

- None of the tests on material samples coming from 'mono-material' separate collection using bottle banks have demonstrated levels of contaminants exceeding 3% in weight and the size of cullet has always been suitable for

treatment before recycling in the glass container industry;

- The quality of glass is worse as the changes made to the ideal model (mono-material waste collection using bottle banks) increase, ie the level of impurities increase when moving from collecting glass on its own to a combined delivery of one or more materials and even more so when moving from a bottle bank to a domestic bin in door-to-door collection.

Table 5 shows the average values of contaminants found over the last 12 years during the qualitative research and analyses carried out by Consorzio Recupero Vetro (together with local collection operators), on the various waste collection systems used in Italy. The amount of glass packaging wasted as scrap that does not successfully complete the treatment process and does not become furnace-ready cullet for glass melting (in a closed loop recycling) according to the different collection systems adopted is also given.

Depending on the collection systems adopted in Italy, the percentages of cullet available for recycling in the glass container manufacturing industry are summarised in Table 6.

Some 1,570,000 tonnes of glass was recycled during 2011, of 1,682,000 tonnes collected in Italy, as a consequence of the spread of municipal collection systems differing from the ideal. The difference was not 'serviceable', ie it was not recycled as furnace-ready cullet but became part of the scrap and as such was delivered for disposal to landfill or sent to further treatment for secondary end use markets. Conversely, if 1,682,000 tonnes had been collected by the best system, about 1,600,000 tonnes would have become serviceable after reprocessing, with minimal production of scrap and without the need to forward it for secondary treatment to recover a part of it.

OBJECTIVES

Table 7 lists COREVE's future targets to improve present recycling results (60% minimum recycling was imposed by Directive 94/62/EC). To achieve these targets, it will be necessary to improve the average quality of Italian glass collection, to launch mono-material glass collection in larger cities, sorted by colour, coloured cullet (green and amber) and non-coloured cullet (flint and half-white) and/or introduce glass cullet selection by colour in the treatment plants and to ensure through technological updating that treatment plants are properly equipped and widely opened to alternatives to recover/recycle cullet scraps that are not destined to be recycled as furnace-ready cullet in glass packaging manufacturing plants. ■

ABOUT THE AUTHOR:

Massimiliano Avella is in charge of the technical area, R&D, marketing and communication at Consorzio Recupero Vetro

FURTHER INFORMATION:

Consorzio Recupero Vetro, Milan, Italy
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Extended producer responsibility

Extended Producer Responsibility (EPR) is a policy approach in which the producer's responsibility for the product extends to the post-consumer management of that product and its packaging. Here, GPI President, Lynn Bragg considers this topical issue.



Lynn Bragg.

A producer's responsibility for post-consumer management of the product/package includes ensuring the recovery and reuse or recycling of materials associated with the product or packaging.

Supporters of many EPR proposals are interested in addressing the cost of recycling programmes, which often comes at the expense of quality collection and high material yields. EPR programmes should focus on sound environmental outcomes and can be designed to obtain high rates of recovery of post-consumer materials and cradle-to-cradle recycling of recovered materials.

GPI and its member companies support the following principles related to EPR:

- **Performance targets should be designed to promote 'closed loop' recovery as the highest potential use.**

EPR programmes should take into consideration: Diverting

recyclable materials from landfills; increasing or maintaining access to high quality recycled materials for reuse in manufacturing; cost and financial obligations; potential cost savings to municipalities through increased recycling; and programme scope.

- **Key stakeholders in this debate include consumers**

- financial incentives and penalties drive consumer behaviour. Consumer behaviour is key to the success of any programme. Consumer deposit refund programmes can be effectively utilised within an EPR system and deposits have proven to be effective to ensure quality recycling and ensure the highest rate of recovery in many jurisdictions.

- **EPR programmes should be limited to a manageable scope**

- EPR systems should capture household, away from home and on-premise consumption, while differentiating among them as to collection and handling methodologies.

- **Material (packaging) producers should have a significant role in governance,**

so as to ensure that any programme is fairly administered and is focused on post-consumer recovery, closed loop usage and development of post-consumer end markets. Packaging manufacturers have a responsibility to serve as - and develop - end markets to help maximise closed-loop recycling. They also have a responsibility to optimise their packaging for recyclability.

EPR programmes should not distort the packaging marketplace or direct retailers or brand owners to certain kinds of packaging. Instead, packaging optimisation and appropriate closed loop recovery should be the goal. GPI opposes penalties in payment calculations based on weight because they are inadequate methods of calculating the full life cycle impact of a package and are concerned that much of the framework surrounding the vast majority of EPR proposals focus on increasing collection of covered products and not the final disposition of the recyclables collected.

Recent studies have shown that states and cities that have found alternatives to EPR actually realise improved recycling rates at a lower cost than mandatory programmes. For example, a 2012 SAIC study funded by the Grocery Manufacturers Association found the municipal solid waste recycling rate in the USA where there is no packaging EPR is 24% – higher than Canada

and the European Union, two places where EPR is widely employed (which stands at 18% and 23%). The study goes on to say that EPR does not necessarily make waste and recycling systems more efficient or decrease costs.

EPR MOVING FORWARD

EPR is being considered by several states legislatures. While the framework varies from state to state, at its core, EPR creates a producer responsibility organisation (PRO) that is in charge of ensuring that certain recovery rates and fees are attached to covered items. Typically, brand owners are tasked with developing the details of the programme, many of which are often finalised after the legislation is signed into law. These PROs should not be given anti-trust immunity when developing costs associated with recycling covered products and all stakeholders, including end-use manufacturers, should be at the table if and when product fees are assigned.

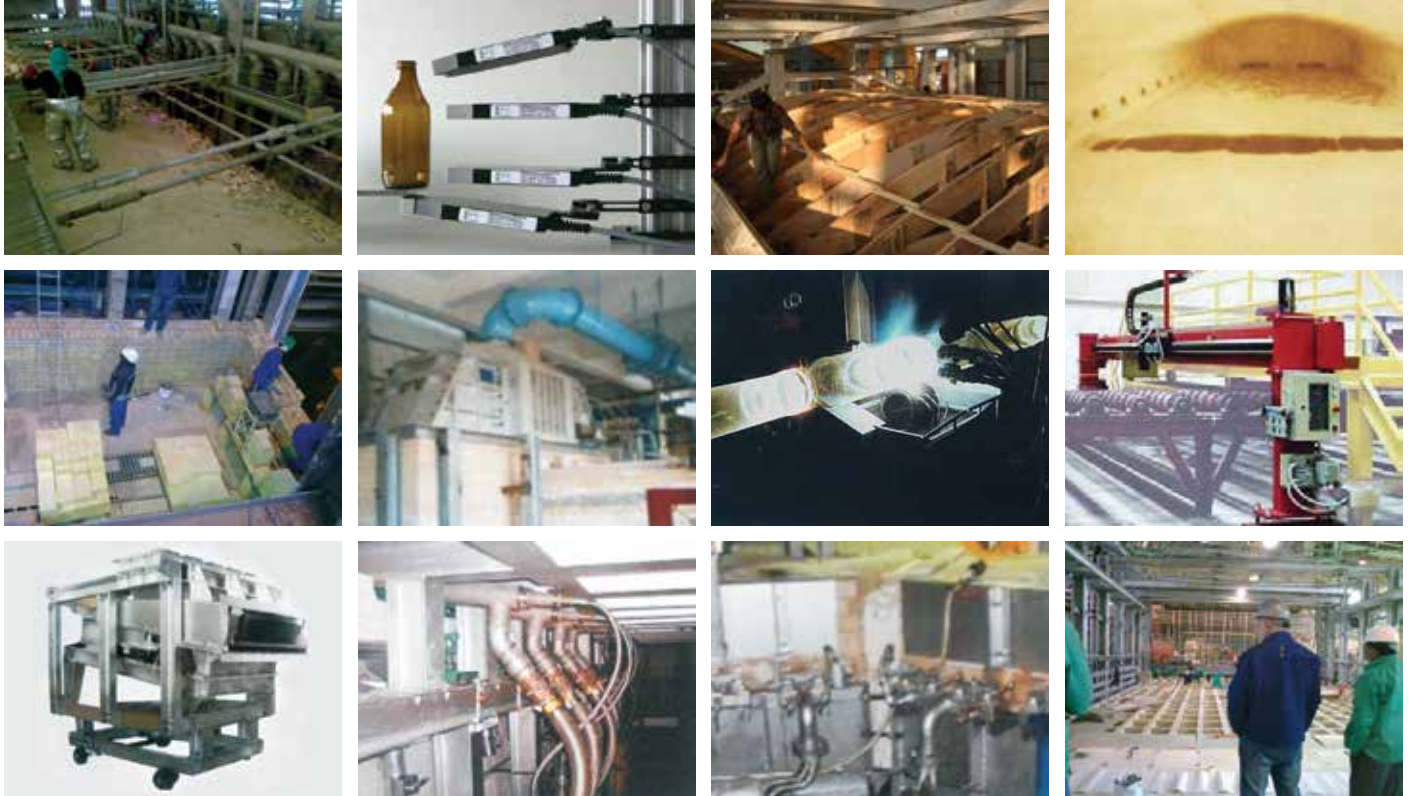
While earlier EPR legislation considered more difficult to recycle items, such as paint, certain medical devices and mattresses, this has expanded over the past few years to include packaging and printed materials. The Glass Packaging Institute and its members actively monitor and support state and federal legislation that will improve the quality of recycled glass containers, while ensuring economic efficiency and environmental benefits. ■

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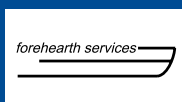


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Special Glasses for Electro-Chemical Applications:

Part-II: Solid-State Batteries



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WEST BENGAL UNIVERSITY OF TECHNOLOGY, KOLKATA.
asisbanerjee1000@gmail.com

Abstract:

The development of basic science drives Technology. The principles of basic science are always used in the design of various technologies, and glass technology is no exception in this respect. Comparatively speaking, the development in the field of newer types of glasses and moreover on the newer types of applications is relatively recent. This has to be appreciated in the context of glass technology over many hundred years. Some details on special types of glasses are presented for “electrochemical applications” for solid-state batteries in order to appreciate how the development takes place by the need of the society.

I. INTRODUCTION:

Very recently, silicate glasses were the major type of materials that were commonly used by the households, different industries, building and other construction purposes, decorative applications, etc., although glasses have been used for various purposes for thousands of years. The advent of float glasses has also evoked a number of new applications [1]. During the past decades, so many new types of glasses have been discovered for satisfying different technical and other needs of human society. The method of fabrication of such type of so-called technical glasses with a wider composition range outside the realm of silicates has come into existence. The refinements of the process technology are continuously evolving for satisfying the needs of the hour, and thereby cutting cost and easy availability. In that sense, there is a similarity with those evolution processes of commercial silicate glasses. A comparison is not made here, as it is beyond the scope of the present article.

These special or technical glasses are available in the form of both bulk and thin-films. From the business point of view, it makes sense for value addition and it gives a very good measure of “tonnage to investment” ratio. This might be one of the main reasons for their rapid development and also the expansion of the field of work, and thereby extending the range of their usage, e.g. in electro-chemical, electronic, magnetic and optical applications. Some of these applications could be considered as hi-tech in terms of applications.

Glassy materials have several advantages over their crystalline counterparts as far as applications are concerned. Generally speaking, glassy materials are relatively much easier to fabricate: large areas [2], homogenous thin-films [3], complicated shapes [4] can be prepared. For example, Si:H for solar cell or thin-

film transistors, while for bulk glasses can readily be prepared from the melt of different volumes by relatively slower quenching procedure or by sol-gel route. Moreover, quite importantly, the material of fabrication could remain workable near the glass transition temperature. This means that the viscosity remains relative low for the glass to be workable over the range of temperature so that it could be fashioned into various shapes and sizes, or drawn into fibres, as desired. It should be further noted that particularly bulk glasses are often structurally homogeneous and isotropic on macroscopic length scale (i.e. uniform property in any direction). As a result, the concerned physical properties are also isotropic and homogeneous unlike crystalline materials for which the intrinsic behaviour of even single crystals may be anisotropic (i.e. different values of a given property in different directions), and also the presence of 'grain boundaries' in polycrystalline samples could dominate the overall behaviour.

Therefore, the large-scale optical transparency is readily achievable, e.g. in silicate glasses for optical components including optical windows and fibre-optic cables for optical communication systems. The absence of structural defects, such as grain boundaries or dislocations as an area of concern in crystalline materials, also has a tremendous impact on the 'mechanical behaviour' and on the use of glassy materials in mechanical engineering applications. Due to this mechanical advantage, the glasses can often reach the 'ideal' value of mechanical strength and consequently the fibres of silica glass or ribbons of metallic glasses could be used as fibre-reinforcement elements in composite materials. It has to be noted that some of these composites could be very expensive in the aviation industry.

Moreover, glassy materials have another important advantage over their crystalline counterparts in getting a homogeneous structure even in the multi-component systems in a wide range of compositions. The physical properties are sometimes "additive" in nature, and they can be varied continuously by changing the percentage of one or more components within a particular base-glass composition. In this way, in the ornamental or decorative silicate glass matrix, the intensity of the colour can be controlled by

varying the concentration of transition metal ions, i.e. colouring agents.

In this paper, one of the important technological applications of glassy materials are explored. In particular, here electro-chemical applications are considered in terms of electro-chemical sensors in Part-I. In the Part-II for the same application, solid-state batteries based on glassy materials will be described, i.e. it is focussed on two most popular applications in the field.

II. ELECTRO-CHEMICAL APPLICATIONS:

The diffusion of different alkali ions, such as Na^+ , K^+ or Li^+ and alkali metal ions, e.g. Ag^+ inside the glass matrix is important to understand different chemical behaviours of glasses. This diffusion is a thermally-activated process and hence to stop diffusion of such ions at higher temperature of exposure of a given glass could be somewhat difficult. Likewise, the same is true for the chemical corrosion of a glass at elevated temperature. This behaviour can be also due to a chemical gradient and an electric field gradient.

The ability of such ions to diffuse readily in oxide or chalcogenide (i.e. sulphur, selenium, and tellurium) based glasses in the present of a concentration gradient or an electric field opens up a range of options in the field of electro-chemical applications. For example, in energy storage (batteries), displays or chemical sensors, glassy materials can be good candidates by offering certain advantages in such applications over their crystalline or liquid counterparts. Glassy electrolytes that could be often made in the form of thin-film have more isotropic diffusion compared to many well-known crystalline electrolytes.

2.1 Solid-State Batteries:

At present, due to increasing usage of many home appliances, all-solid-state battery is the norm of the day and increasingly becoming popular in day-to-day use. This is achievable by using a solid electrolyte at high temperature, in the application in micro-electronic devices, and to avoid leakage and packaging problems that are inherent in liquid battery cells involving conventional liquid electrolytes. If ionically conducting solids have to be used as electrolytes in batteries, several

specific requirements have to be satisfied. These requirements can be summarized as follows:

- 1) There are certain constraints on the conductivity, i.e. the ionic conductivity should be high compared to that of liquid electrolytes, whose conductivity value at room temperature is 10^{-2} Ohm.cm. It means that the solid glass should be superior so that the internal resistivity of the components of battery-cell is not significantly high. On the contrary, the electrolyte material should have a negligible 'electronic' conductivity such that the battery-cell is not internally short-circuited that could shorten the life-cycle of the battery.
- 2) Certain chemical constraints have to be considered, such as the stability of the glassy material that should be high, particularly with respect to the electrode reactions at the interface with the anode and the cathode.
- 3) Some mechanical considerations have to be given on the sufficient flexibility of the so-called ideal electrolytes for internal mechanical contact. Therefore, the electrical contact has to be maintained throughout the discharge process of primary cell when the material is removed from the anode area, and throughout the charging and discharging cycles of a secondary cell, when a change of volume may take place. This becomes important when intercalation-type materials are used in the system.

From a survey of the existing literature on the subject, it is found that ionically-conducting glasses fulfil most of these requirements, if not all. Consequently, such solid electrolytes are getting used in certain battery applications. These electrolytes have an extra advantage over conventional 'liquid electrolytes' in that only one type of ion is generally 'mobile' and the other being part of the structural framework of the glass is immobile [5].

In this context, lithium-based batteries are gaining popularity in energy-storage systems, where a high specific energy capability that is expressed as Wh/Kg. A typical cell which has been designed consists of Li-metal anode, a crystalline TiS_2 intercalation-type cathode and as electrolytes, a LiI-doped $\text{Li}_2\text{S-P}_2\text{S}_5$ glass. This glass has a room temperature Li^+ ion of conductivity of 2×10^{-3} Ohm.cm [6]. This type of battery has a high specific energy characteristic

of 150 Wh/Kg compared to that of 40 Wh/Kg for a lead-acid accumulator cell and there is an output voltage of around 2V. This is obtained with a rather high current density that ranges from 0.11 to 1.01 mA/cm² for room temperature and 100°C respectively [6,7].

Glassy electrolytes are also employed for other applications, e.g. in the sodium-sulphur battery that is operated at high enough temperature (300 C), at which both sodium and sulphur ions are in the liquid state. This is to enable Na_2S to be dissolved well in the sulphur. In this case, the electrolyte is sodium-borosilicate glass in the form of hollow fibre, which then serves to separate molten electrode materials. This cell also has a high specific energy characteristic at 120 Wh/Kg, and a voltage of 2V, and it can provide current densities up to 4 mA/cm² [7].

There has been a certain amount of research activity on the development of glassy electrolytes that are suitable for better applications, but lesser amount of work has been done in the study of glassy cathode materials making the 'monolithic battery' elusive. One such possibility for making cathode material is to explore the prospect of constructing the 'rechargeable, i.e. secondary, all-solid-state batteries. This method consists of insertion of crystalline layered compounds, such as TiS_2 in which the cell ions, i.e. Li ions, can be intercalated. It is noteworthy that the metal intercalation is accompanied by the charge transfer to the host metal d-band in the form: $\text{Ti}^{4+} + e^- \rightarrow \text{Ti}^{3+}$. Although these types of cathode materials have the disadvantage of appreciable change of volume during de-intercalation process, it leads to the problem of 'contact', as described in point number (3) above, the cathode-electrolyte interface that results in the loss of reversibility in the charging or discharging cycle.

This problem could be solved by using glassy cathode materials within which Li ions may be reversibly introduced. This may be considered as 'mixed conductors', they show an intrinsic electronic conductivity. This allows a cathode made from such a material to be in good electrical contact with the external circuit as well as extrinsic ionic conductivity when containing inserted ions. To give an example, such possible glassy cathode materials are glasses containing transition metals,

e.g. $V_2O_5 - P_2O_5$ [8] or $BaO-B_2O_3-V_2O_5$ [9] mixtures and glassy molybdenum sulphides, i.e. MoS_2, MoS_3 . In such situations, the electronic conductivity arises from hopping of electron+oxygen charge cloud (collectively called 'small polaron') from lower valence state to higher valence state (say, from V^{4+} to V^{5+} in vanadate glasses). These materials are attractive, as the changes in volume occurring upon insertion can be relatively smaller than that characteristic of crystalline compounds, say, in Ca-stabilized zirconia, which is a good ionic conductor.

After having described solid-state battery systems, it has to be said that another goal is to find a glass-forming material that could be sulphide-based chalcogenide type of glass. This could be used as the basis of superionic-glassy solid electrolyte, and also to form an electronically conducting cathode material. This is called "monolithic battery-cell", as describe above. Here, mobile ions would not sense the interface between the electrolyte and cathode, and consequently over-potentials that are associated with such interfaces would be relatively reduced to some extent.

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14 SMART WAYS TO GO GREEN AT WORK

Going Green at work is a natural extension of taking environment-friendly measures at the workplace the way we do in our daily lives. It's time we bring the green quotient into action and here's how.

1. Set Energy-Saving-Settings for your Work-Desktop
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 - Set turn off hard drives/hard disk sleep-timer: 15 minutes or less; and
 - Set system standby/sleep-timer: After 30 minutes or less.
2. Artificial lighting accounts for 44 percent of the electricity use in office buildings.
 - Turn off the lights when you're leaving any room for 15 minutes or more.
 - Natural light should be utilized whenever possible.
 - LEDs use 1/3rd to 1/30th of Incandescent or Compact Fluorescent Lights and last up to 10 times as long as CFL's. Hence, using LEDs in the office space is a smart choice to reduce electricity use, manage power and cut the costs.
3. Print on both the sides of the paper or use the back side of old documents for faxes, scrap paper, scribbling or drafts.
4. As compared to the desktops, laptops are energy-efficient as they use 50% less energy than desktops. Replacing laptops with the desktops seems to be a smart choice.
5. Detoxify the ambience by keeping small green plants indoor. Indoor plants help in removing chemical toxins present in the air. They produce oxygen which helps in maintaining air quality inside the building. Areca Palm, Money plant and Mother-in-law's Tongue are some of the common indoor green plants that can be used for keeping the indoor air fresh and clean.
6. Conserve water. Replace those conventional water fixtures with water-efficient fixtures like sensor taps, waterless urinals, water closets with dual flush systems etc. Water-wise practices like using of grey-water, reusing RO water and RWH should be followed as they help in reducing the amount of water consumed.
7. Green Cleaning should be promoted. Certified cleaning products that are should be put into use.
8. Reconsider commuting. To decrease carbon footprints, one can take public transit like metro, bus or opt for carpooling. Use green fuel for your vehicle like CNG. Also, get your vehicle serviced and checked

(pollution test) at least on a monthly basis. This will help in reducing the emissions.

9. From fax paper, junk mail to plastic bottles; recycle everything that gets collected in the trash or waste bins. Purchase office supplies made from recycled materials.
10. Take care that indoor materials used in the buildings like furniture, carpets, paint etc have low or no volatile organic compounds (VOCs) and do not off-gas toxic chemicals.
11. Reconsider your business travel plan. Before planning a tour, check if the purpose can be solved by video and web conferencing sessions so that the amount of employee travel, carbon footprints and travel expenses are reduced.
12. Don't get tempted by the offers available in the market while shopping for your kitchen. Avoid additional and unnecessary purchases. You will be able to manage your food waste effectively then.
13. Don't throw fruits or vegetables just because they are going soft. They can be made into smoothies, fruit-pies, chutneys, sauces etc. Think of other possibilities of retaining that yum-factor.
14. Set a compost bin for fruit and vegetable peels. Compost them. Within a few months you will have rich manure for your plants. You can also dump the cooked food waste in the compost.

GROW YOUR OWN INDOOR FRESH AIR FOR HEALTHY AND BETTER LIVING

-An innovative way to go green

As a study reveals, indoor air pollution is considered as the second highest killer in India and is generally 5-10 times more polluted than ambient air.

Indoor Air pollution can lead to the possibilities of eye irritation, respiratory symptoms, lungs impairment, Asthma, headache and more.

According to a study, 27.5% under-five infant mortality is because of indoor air pollution. The researchers have found that a daily average increase in particulate matter of 6 micrograms per day over two days raise the risk of OHCA by 4.6%, with particular impact on those with pre-existing

(and not necessarily cardiac-related) health conditions. Hence, it is important that indoor air quality is properly maintained in the living and working space. One of the ways to combat indoor air pollution is by growing fresh air indoors.

Following are some measures that can help you to attain healthy and fresh indoor air:

1. Grow right kind of toxin removing plants. They not only help in detoxifying the indoor air, of the chemical toxins present in it but also help in increasing blood oxygen levels of the building occupants. Areca Palm, Money plant and Mother-in-law's Tongue are some of the common and easy-to-maintain indoor green plants. Areca Palm and Money Plant produce Oxygen during the day time while Mother-in-law's Tongue produces O₂ during Night-time.
2. Companies can install Air Purifiers with activated carbon filters and ionizers to filter air.
3. Ingress of untreated air should be avoided.
4. To maintain good air quality, smoking and eating should be allowed only in the designated areas.
5. Organizations should have a well equipped Indoor Air Quality (IAQ) department with lab facilities and a dedicated Indoor Air Quality Manager to monitor it.

IAQ system not only helps in cleansing the air but also helps in reducing the energy consumption as it has been in our case. There has been almost a 30% reduction in our electricity bills. We will be replicating this system in one of our mega projects namely, "Greenspaces".

Last but not the least and the most important way of going green is by spreading the word, especially at schools educating children from the primary level onwards. Tell your colleagues and friends about simple measures that can help you stay eco-friendly. Encourage them to do so. Ask others to come up with their ideas and let those ideas go viral. Use your social media network to disseminate these ideas. Get involved in group chats or discussions about going green and get others involved in it.

These simple and easy measures can take you long on the green pathway. Do your bit, go green and live healthy. ■



Indian Green Building Council (IGBC) of CII is organising its flagship event Green Building Congress 2013, *International Conference & Exhibition on Green Buildings* from Oct 24–26 at Chennai Trade Centre, Chennai, India.

Spearheading the green building movement in India is Indian Green Building Council (IGBC) of CII. Green Building movement in India was triggered off when CII-Sohrabji Godrej Green Business Centre building in Hyderabad became the first Platinum rated green building rating in India. Since then, Green Building movement in India has gained tremendous impetus over the years. As on date, over 2,155 green building projects amounting to over 1.52 Billion sq.ft of green building footprint are registered with IGBC, making India one of the top three countries with largest green building footprint in the world.

Today all types of buildings, all over the country are going the Green way. Buildings include: Airports, Banks, Colleges, Convention Centres, Factories, Hospitals, Hotels, Institutions, Existing Buildings, IT Parks, Offices, Residential, Schools, SEZs, Townships, etc. The reason for this significant progress is the fact the green buildings makes good business sense. Though the incremental cost of a commercial green building would be 3-5 % and a green home incremental cost 1 %, the additional costs gets paid back within an attractive span of 3 to 4 years with substantial reduction in operational costs. Today constructing green buildings are technically feasible and economically viable.

The vision of the Council is 'to enable sustainable built environment for all and facilitate India to be one of the global leaders in sustainable built environment by 2025'.

Green Building Congress 2013 will feature a three day conference and parallel exhibition showcasing Green Building Technologies / Products / Services. The major objective of the Green Building Congress 2013 is to facilitate India in emerging as one of the global front-runner in green building design, products and technologies. Green Building Congress, is one such event where the stakeholders of Indian construction industry would look forward to attend to share, network and explore new opportunities , which in turn will facilitate the spread of green building movement in the country. ■

<p>IGBC 2013 will focus on:</p> <ul style="list-style-type: none"> • Architectural perspectives in Green Buildings • National and international experiences on Green Building concepts • Green Building Movement- global trends • Case studies on Green Buildings- national and international • Green Building Rating Systems • Green Building materials, equipment & technologies • Public Policies 	<p>Benefits to Participants:</p> <ul style="list-style-type: none"> • Awareness on the latest trends in green buildings • Provide networking opportunities and information sharing amongst all the stakeholders • Showcase green building products and technologies • Platform to launch new green building products • Train building professionals on green building concepts • Facilitate market transformation
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GreenBuilding Congress 2013 will feature the following events:

Advanced Training Programme	22 & 23 October	Conference on Green Homes	26 October
International Conference	24 & 25 October	Conference on Existing Buildings	26 October
International Exhibition	24 & 25 October	Conference on Green Interiors	26 October

For more on the event, please visit <http://www.greenbuildingcongress.com/site/gbc/index.jsp>



Confederation of Indian Industry



Indian Green Building Council
Greening India since 2001

11th Edition

Green Building Congress 2013



India's Flagship event on Green Buildings

International Conference & Exhibition on Green Buildings

24-26 Oct 2013

Chennai Trade Centre, Chennai, India

Asia's Largest Green Building Conference & Exhibition

Block Your Dates
24-26 Oct 2013

Venue: Chennai Trade Centre
Chennai, India

Welcome to Indian Green Building Council's (IGBC) 11th edition of Green Building Congress 2013 at Chennai

Showcasing various
green building technologies & best Practices

to be attended by over

2,000 Green Building Professionals
across the globe

Join us...



Dr Prem C Jain
Chairman
IGBC



Mr C N Raghavendran
Chairman
IGBC Chennai Chapter



Mr N K Ranganath
Conference Chair
Green Building Congress 2013



Mr Ajit Kumar Chordia
Chair, Exhibition Committee
Green Building Congress 2013



Mr V Suresh
Chair, Government Committee
Green Building Congress 2013



Mr Rajan Vankateswaran
Vice Chair, Exhibition Committee
Green Building Congress 2013

Participants Profile :

- Architects
- Building Authorities
- Builders & Developers
- Corporate
- Contractors
- Educational Institutions
- Engineers
- Energy Modelers
- Electrical Consultants
- Government Representatives
- Green Product & Equipment Manufacturers
- Green Building Facilitators
- Hospitality Industry Professionals
- HVAC Consultants
- Landscape Consultants
- Lighting Consultants
- Plumbing Consultants
- Interior Designers
- Project Management Consultants
- R & D Institutions
- Town Planners

For more details , please contact:

Shyamchander K | shyamchander.k@cii.in | +91 40 4418 5173

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*Confirmed as on 30.07.2013

काँच प्रौद्योगिकी, उद्योग व व्यापार का सम्पोष्य विकास: समन्वित सहयोग की महत्ता

(Sustainable Development of Glass Technology, Industries and Business; Importance of Mutual Cooperation)

देवेन्द्र कुमार

प्रोफेसर

सिरामिक अभियान्त्रकी विभाग, भारतीय प्रौद्योगिकी संस्थान,
(काशी हिन्दू विश्व विद्यालय) वाराणसी – 221005

devendra.cer@itbhu.ac.in



काँच एक सस्ता व सर्वसुलभ पदार्थ है। यह अनेक रूपों व आकारों में उपलब्ध है तथा इसके अनेक बहुआयामी उपयोग हैं। काँच के निर्माण की मूलभूत पद्यति यद्यपि बहुत सरल है, लेकिन उपयोग तथा उत्पादन क्षमताओं के अन्तर के कारण, विभिन्न काँच उद्योगों में काफी अन्तर रहता है। जैसे समतल काँच बनाने वाले, दवा तथा खाद्य पदार्थों की पैकेजिंग के लिये जार व बोतलें बनाने वाले, विद्युत बल्ब, टीवी पिकचर ट्यूब या स्क्रीन, सजावटी वस्तुएँ बनाने वाले या अन्य प्रकार के काँच उद्योगों में काफी अन्तर रहता है। इन उद्योगों की उत्पादन कार्यप्रणाली, क्षमता तथा व्यापार में काफी अन्तर रहता है। काँच के व्यापार में भी सैकड़ों प्रकार के प्रतिष्ठान जुड़े हुए हैं। इन विभिन्नताओं के कारण काँच प्रौद्योगिकी, उद्योग व व्यापार के विकास के लिये एक समग्र दृष्टिकोण, मॉडल व नीति बनाना बहुत ही कठिन कार्य है। विकास के बिना काँच उद्योग व व्यापार में स्थायित्व लाना भी एक दुष्कर कार्य लगता है। काँच प्रौद्योगिकी में नवीन अविष्कार काफी अन्तराल के पश्चात ही आते हैं। अतः काँच तथा काँच वस्तुओं के उत्पादन तथा व्यापार में काफी प्रतिस्पर्धा रहती है। काँच के उत्पादन व व्यापार के क्षेत्र में लगे हुए औद्योगिकी व व्यापारिक प्रतिष्ठान इन प्रतिस्पर्धात्मक परिस्थितियों में अपनी इकाइयों के लिये अधिक से अधिक लाभ कमाने में लगे रहते हैं। प्रतिस्पर्धा गोपनीयता को बढ़ावा देती है। अत्यधिक प्रतिस्पर्धा व गोपनीयता पारस्परिक सहयोग में कमी लाती है तथा आवश्यक सूचनाओं के आदान प्रदान तथा सम्पर्क पर निषेधात्मक प्रभाव डालती है। पारस्परिक सहयोग की कमी तथा निषेधात्मक व्यवहार या प्रवृत्ति, प्रौद्योगिकी, उद्योग व व्यापार के समग्र व सम्पोष्य (Integrated and sustainable) विकास के लिये नकारात्मक सिद्ध होती है।

पिछले दो वर्षों से मैं आल इण्डिया ग्लास मैनुफैक्चरर्स फ़ैडरेशन (AIGMF) के सहयोग से काँच उद्योगों का भ्रमण कर रहा हूँ। इन भ्रमण की अनुभूतियों के आधार पर मेरा यह निष्कर्ष निकला है कि हम सभी को काँच उद्योग व व्यापार के उन क्षेत्रों की खोज करनी चाहिए, जिनमें उद्योग, व्यापारिक प्रतिष्ठान व शोध व विकास कार्यों में लगे प्रतिष्ठान में आवश्यक सूचनाओं के आदान-प्रदान व सहयोग को बढ़ावा मिले। यह आपसी सहयोग व सूचनाओं का आदान-प्रदान एक स्वस्थ प्रतिस्पर्धा को बढ़ावा देगा जिससे काँच उद्योग सम्पोष्य विकास के मार्ग में अग्रसर होगा। मेरे अनुभवों के आधार पर सहयोग के कतिवय क्षेत्र निम्न प्रकार के हो सकते हैं।

सुरक्षा, संरक्षा व स्वास्थ्य

असाही इण्डिया के रूड़की स्थित फ्लोट काँच प्लांट व गुजरात गार्जियन के अंकिलेश्वर स्थित फ्लोट काँच प्लांट के भ्रमण में मैंने पाया कि ये प्रतिष्ठान प्लांट के स्वच्छ वातावरण, तथा कर्मियों की सुरक्षा, संरक्षा व स्वास्थ्य के प्रति काफी सजग हैं। ये अपने प्लांट की गुणवत्ता के एक पैमाने को सुरक्षा व संरक्षा से जोड़ते हैं। असाही इण्डिया में इसके लिये मानक उपायों का भी निर्धारण किया है तथा इन मानक दृष्टिकोण को प्लांट के विभिन्न स्थानों पर दर्शाया भी गया है। कुछ काँच उद्योग सुरक्षा, संरक्षा व स्वास्थ्य उपायों के प्रति सजग नहीं हैं। वे इसको एक अनावश्यक खर्च के रूप में मानते होंगे। लेकिन इनके मानदण्ड स्थापित करने व उपायों को लागू करने से औद्योगिक कर्मियों का आत्मविश्वास व प्रतिष्ठान के प्रति विश्वास बढ़ता है। इसके

फलस्वरूप उत्पादन क्षमता बढ़ती है व उत्पादन क्षमता के विकास से प्रतिष्ठान को लाभ होता है। काँच उद्योग में उच्चताप पर भट्टियाँ संचालित होती हैं। तथा टूटा काँच घातक हो सकता है। अतः इस उद्योग में सुरक्षा व संरक्षा उपायों को अपनाने की अत्यन्त आवश्यकता है। इन उपायों के पालन करने से मशीनों का डाउन टाइम भी कम होता है। काँच के औद्योगिक व व्यापारिक प्रतिष्ठान आपसी सहयोग से मानक सुरक्षा, संरक्षा व स्वास्थ्य उपायों के लिये दिशा निर्देश तैयार कर सकते हैं। जो कम से कम व्यय में व्यवहार में लाये जा सकते हैं।

पर्यावरण संरक्षा

वर्तमान काल में हम सभी पर्यावरण के प्रदूषण व छरण के दुष्परिणामों से भली-भाँति परिचित हैं। काँच का उपयोग पर्यावरण की संरक्षा के लिये भी हो रहा है। जैसे सोलर काँच व इन्सूलेटेड काँच। लेकिन समस्त काँच उद्योग व व्यापार को पर्यावरण के अनुकूल व उसकी सुरक्षा के प्रति सजग बनाने की आवश्यकता है। काँच के मुख्य घटक पदार्थ जहरीले नहीं होते हैं। लेकिन काँच को बुलबुला मुक्त तथा रंगीन बनाने के लिये कुछ घटक पदार्थों का प्रयोग किया जाता है जो जहरीले होते हैं। इनके उपयोग तथा काँच गलाने की प्रक्रिया के दौरान यह सम्भावना बन सकती है कि इन प्रदूषण फैलाने वाले जहरीले तत्व विभिन्न माध्यमों से वातावरण में फैल जाय तथा उसको प्रदूषित कर दें। यदि काँच रासायनिक रूप से ड्यूरेविल नहीं है तो टूटा व अनुपयोगी काँच भी प्रदूषण फैलाने के लिये उत्तरदायी हो सकता है।

काँच पर परत (Coating) चढ़ाने तथा काँच को लैमीनेट करने के लिये विभिन्न प्रकार के रासायनिक पदार्थों का उपयोग किया जाता है। इसके अतिरिक्त दर्पण काँच बनाने के लिये काँच की सतह को पानी की उपस्थिति में ग्राइंड व पालिश किया जाता है जिससे काँच के महीन कण बनते हैं। कोटेड काँच की रिसाइकिलिंग कठिन होती है। अतः अनुपयुक्त कोटेड काँच का कलेट की तरह प्रयोग नहीं होता है। इस प्रकार इन कार्यों में उपयुक्त रासायनिक पदार्थ तथा काँच के कण वातावरण को प्रदूषित करते हैं। असाही इण्डिया के रुडकी प्लांट के भ्रमण के दौरान मैंने यह पाया कि उन्होंने जल को प्रदूषण मुक्त रखने के लिए, जल उपचायक (Water Treatment) यन्त्र लगा रखे हैं। इसी प्रकार अन्य कतिपय काँच उद्योगों में जल उपचायक यन्त्रों की स्थापना के संदेश भी प्राप्त होते रहते हैं। अतः आपसी सहयोग द्वारा काँच उद्योग व व्यापारिक संस्थान पर्यावरण के

प्रति जागरूकता तथा संरक्षा उपायों के नियमन का कार्य भी कर सकते हैं। यह उनका सामाजिक उत्तरदायित्व भी है।

ऊर्जा बचत व भट्टियों का रख रखाव

काँच उत्पादन भट्टियाँ उच्च तापक्रम पर संचालित होती हैं। तथा उनका जीवन काल प्रायः 12 से 15 वर्ष होता है। भट्टियों की एक बार स्थापना होने के पश्चात उनके द्वारा काँच गलाने की प्रौद्योगिकी या प्रक्रिया में बहुत अधिक परिवर्तन नहीं किया जा सकता है। लेकिन इनके संचालन के अनुभव के आधार पर इस प्रकार के उपायों की खोज की जा सकती है कि (i) समुचित रखरखाव के द्वारा भट्टियों का जीवन काल बढ़े, (ii) ऊर्जा ह्रास को रोककर ऊर्जा की बचत की जा सके तथा (iii) उत्पादन क्षमता बढ़ाई जा सके। इन उपायों को अपनाने से न केवल व्यापारिक लाभ बढ़ता है परन्तु पर्यावरण की सुरक्षा भी होती है। प्रौद्योगिकी व उत्पादन गोपनीयता बरकरार रखते हुए भी उद्योग भट्टी के जीवन काल बढ़ाने व ऊर्जा ह्रास को रोकने के उपायों के बारे में सूचनायें साझा कर सकते हैं। इन उपायों को साझा करने से इन कार्यों के लिये मानक उपायों का निर्धारण हो सकता है, जिनको सभी उद्योग अभ्यास में लाकर लाभान्वित हो सकते हैं। वर्तमान काल में अनेक सरकारी व गैर सरकारी प्रतिष्ठान भी इस कार्य को कर रहे हैं।

लाइफ साइकिल असेसमेन्ट तथा कलेट उपयोग

काँच सम्बन्धी पदार्थ अन्य पदार्थों की तुलना में सस्ते होते हैं। अतः काँच उत्पादों का जीवन काल समाप्त होने पर उनका कोई मूल्य नहीं होता है या नगण्य होता है अतः सामान्यतः इनको अवशिष्ट पदार्थ मानकर डम्प कर दिया जाता है। वैसे तो काँच के अवशिष्ट पदार्थ पर्यावरण को कोई नुकसान नहीं पहुँचाते हैं, लेकिन टूटे फूटे काँच के टुकड़े अत्यधिक पैने व नुकीले होते हैं तथा घातक होते हैं। यदि इन काँच के टुकड़ों या टूटे फूटे काँच के डिस्पोजल में सावधानी न बरती जाय तो ये पदार्थ सामान्य जन विशेषकर बच्चों व निरीह जानवरों को घायल करते रहते हैं।

टूटे फूटे काँच (जिसको औद्योगिक भाषा में कलेट कहते हैं) का काँच के बैच के साथ उपयोग करने से काँच गलाने की प्रक्रिया सरल होने के साथ-साथ, ऊर्जा व काँच के मूल घटक पदार्थों की भी बचत होती है। ऊर्जा व मूलघटक पदार्थों की बचत से एक प्रकार से पर्यावरण की संरक्षा भी होती है तथा यह समाज के सम्पोष्य (Sustainable) विकास में बहुत सहायक होती है। पैकेजिंग के लिये काँच बनाने वाले उद्योग काफी मात्रा में कलेट का प्रयोग कर रहे हैं तथा

लाइफ साइकिल असेसमेन्ट प्रक्रिया को अपनाने की ओर अग्रसर है। परन्तु समतल काँच उत्पादित करने वाले उद्योग इस दिशा में विशेष प्रयासरत नहीं लगते हैं। इसका कारण है कि टूटे फूटे काँच को बिना डिग्रेड हुए वापिस उद्योगों तक पहुँचाने की कोई मानक प्रक्रिया निर्धारित नहीं हो पा रही है। समतल काँच में काँच की पारदर्शिता व गुणवत्ता (Quality) काफी महत्वपूर्ण होती है। अतः इन उद्योगों में डिग्रेडेड कलेट का उपयोग नहीं किया जा सकता है। उत्तम गुणवत्ता वाले कलेट का मूल्य भी काँच पदार्थों के मूल्य के समकक्ष या ज्यादा होता है। इस प्रकार इन उद्योगों में अधिक कलेट के उपयोग को प्रोत्साहन नहीं मिल पाता है।

पर्यावरण व रॉ मेटीरियल की संरक्षा तथा उत्पाद मूल्य घटाने के लिये यह आवश्यक है कि सरकारी व सामाजिक संस्थाएँ तथा काँच उद्योग से जुड़े औद्योगिक व व्यापारिक संगठन आपसी सहयोग से समन्वित प्रयास करें जिससे कम से कम लागत में, उपयोग किये हुए टूटे फूटे काँच के टुकड़ों को बिना कन्टेमिनेशन के वापिस काँच उद्योगों तक पहुँचाया जा सके। इस प्रकार ये उद्योग अधिक से अधिक मात्रा में कलेट उपयोग के लिये प्रोत्साहित हो सकेंगे। अधिकतर समतल काँच के विक्रेता बड़े आकारों का काँच खरीदकर, छोटे आकारों में काटकर विक्रय करते हैं। इस प्रक्रिया में काफी मात्रा में छोटे काँच के टुकड़े बच जाते हैं। सामान्यतः विक्रेता इन काँच के टुकड़ों को कन्टेमिनेट होने से बचाने तथा उद्योगों को वापिस पहुँचाने में उत्सुक नहीं रहता है। यदि इस अनुपयुक्त काँच को एक मानक प्रक्रिया द्वारा समतल काँच उद्योगों तक पहुँचाया जाये तो इसका लाभ सभी को प्राप्त होगा।

काँच प्रौद्योगिकी का संवर्धन व आकलन

काँच उत्पादन आधारित प्रौद्योगिकी को मुख्यतः दो भागों में बाँटा जा सकता है। काँच निर्माण प्रौद्योगिकी तथा काँच उपयोग प्रौद्योगिकी। काँच निर्माण प्रौद्योगिकी जटिल, वैज्ञानिक, प्रौद्योगिकी व अभियान्त्रिक सिद्धान्तों व गणनाओं पर आधारित होती है। इसके अतिरिक्त एक अच्छी काँच भट्ठी का जीवन काल 12 से 15 वर्ष तक होता है। अतः द्रव काँच या काँच निर्माण प्रौद्योगिकी में परिवर्तन काफी लम्बे अन्तराल के पश्चात होता है। प्रत्येक काँच उद्योग अपने स्वयं अनुभवों के तथा उनके प्रौद्योगिकी सलाहाकारों के परामर्श के अनुसार गुणवत्ता युक्त काँच के उत्पादन का प्रयास करता है यही उसकी प्रतिस्पर्धात्मक शक्ति होती है जो उसे समान व समसामर्थि उद्योगों से अग्रणी बनाती है। काँच उद्योग, शिक्षण व अकादमिक संस्थानों के सहयोग

से, बिना काँच के सघटकों तथा प्रक्रियाओं की सूचनात्मक सहयोग या आदान प्रदान के, अतिरिक्त काँच प्राद्योगिकी विज्ञान तथा ऊर्जा के क्षेत्र में आपसी सहयोग कर सकते हैं। यह सहयोग उनको अन्य उद्योगों से प्रतिस्पर्धात्मक ताल मेल बैठाने में सहायता कर सकता है तथा सरकारी तथा अर्धसरकारी कानूनों के सुगमता पूर्वक पालन में सहायता कर सकता है। वे काँच उद्योग की खुशहाली के लिये सयुक्त रूप से अपनी आवाज भी उठा सकते हैं।

काँच प्रौद्योगिकी का दूसरा क्षेत्र है काँच के उपयोगी समाधान (Glass Solution)! वर्तमान में इस क्षेत्र में विकास की अपार सम्भावनाएँ व Challenges है। काँच के इन उपयोगी समाधान के द्वारा काँच व्यापार में नवीनता आती है तथा सुदृढ़ बनता है। काँच के नवीन से नवीन उपयोगी समाधान बाज़ार में आ रहे हैं तथा ये समाज के रहन-सहन के स्तर पर अमिट प्रभाव छोड़ रहे हैं। काँच के नवीन उपयोगों की खोज तथा उनके सामाजिक प्रभावों के अध्ययन के लिये सामूहिक प्रयास किया जा रहा है। वर्तमान में काँच का उपयोग बहुतायत में वास्तुशिल्प व भवन निर्माण में हो रहा है। इसी दिशा से समतल व कुचालक काँच का उपयोग देश व विदेशों के हवाई अड्डों (Air Ports) में हो रहा है पिछले एक वर्ष के दौरान कोलकत्ता, चेन्नई तथा वाराणसी के एयरपोर्टों में काँच के पैनलों के बहुतायत में टूटने के समाचार आ रहे हैं। यह एक चिन्ता का विषय बना हुआ है। इनके कारणों की खोज की जा रही है। लेकिन इन रिपोर्टों ने काँच के उपयोग तथा व्यापार पर विपरीत प्रभाव डाला है। शिक्षण व अकादमिक संस्थान विभिन्न औद्योगिक विषयों के अध्ययन व अनुसन्धान में लगे रहते हैं। इस ज्ञान, विज्ञान व प्रौद्योगिकी के आधार पर उनकी सोच व दृष्टि दूरगामी हो सकती है। लेकिन उनको वास्तविक औद्योगिकी व व्यापारिक प्रक्रियाओं व सम्भावनाओं का ज्ञान नहीं रहता है।

औद्योगिक इकाइयों, व्यापारिक प्रतिष्ठानों व अकादमिक संस्थानों के विशेषज्ञ एक दूसरे के पूरक हो सकते हैं। यदि ये आपसी सहयोग व तालमेल से बिना एक दूसरे के क्षेत्रों में दखल दिये कार्य कर सकें तो औद्योगिक जगत का तेजी से सम्पोष्य विकास (Sustainable Development) हो सकता है। यह विकास का मॉडल, प्रकृति व वातावरण के अनुकूल तथा मानव के लिये कल्याणकारी हो सकता है। आगे आने वाली पीढ़ी के लिये भी यह अनेक विकास व सृजनात्मक सम्भावनाओं से ओत-प्रोत हो सकता है। ■

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GARRY SMITH, SENIOR FLAT GLASS SPECIALIST, JOINS GTS

A flat glass expert with more than 25 years' industry experience has joined Glass Technology Services (GTS) as part of a major investment programme to meet increasing demand for testing and consultancy throughout the supply chain.

Garry Smith joins the GTS team from NSG Group, where as Technical Advisory Service Manager for nearly ten years, he provided specialist advice on the specification and use of glass. He was also responsible for troubleshooting projects and providing support on technical issues for designers, architects, specifiers and end-customers. Garry was previously a manager with Pilkington/NSG group manufacturer Plyglass, responsible for their high performance and technical glass products.

Providing technical expertise across all areas of flat glass manufacture, performance and use, including the latest standards, specifications and regulations, Garry joins GTS during a period of significant expansion for the specialist team.

"I'm joining GTS at a time of significant investment and innovation for the company," said Garry. "As well as working with other specialists in the laboratory, I will be carrying out on-site investigations and delivering training on flat glass properties and performance. I've had a long association with the team and this is a great opportunity to further expand its work in a dynamic sector of the glass industry."

Garry will provide advice on the mechanical strength, safety and security of glass, failure analysis and environmental issues. His specialist knowledge also covers specific properties of glass in use including fire safety, acoustics, solar and thermal management.

He has regularly provided advice and support to both individual companies and professional associations - including the Flat Glass Manufacturers Association (FGMA), the Glass and Glazing Federation (GGF), the Centre for Window and Cladding Technology (CWCT) and Council for Aluminium in Building (CAB) and is a well-respected industry speaker and training provider.

TWO MAJOR PLATE GLASS MAKERS FINED FOR RIGGING PRICES

South Korea's antitrust watchdog has fined two major domestic plate glass makers a combined 38.42 billion won (US\$34.24 million) for colluding on product prices.

Subject to the fines are KCC Corp., and Hanglas, which account for about 80 percent of the country's plate glass market. They were ordered to pay 22.45 billion won and 15.97 billion won, respectively, according to the Fair Trade Commission (FTC).

The FTC added that it will refer two executive officials from the companies to the prosecution for further investigation.

They are accused of colluding to raise prices of 5-6 mm plate glass products used for construction four times from November 2006 to April 2009. The product prices were allegedly raised by about 10-15 percent each time.

They were found to have fixed prices through phone calls and offline meetings, and raised product prices in

different timing in order to avoid suspicion from authorities, the FTC said.

The price hikes were shifted to the prices of apartment buildings that used the materials, eventually causing damage to many home purchasers, according to the corporate watchdog.

The two companies were fined in 1997 on similar charges.

ALCOHOLIC PACKAGING CLEARLY FAVOURS GLASS

Recent analysis has determined that glass is the leading packaging type for alcoholic beverages worldwide, with retail sales reaching almost 200 billion units in 2012.

The Asia Pacific region accounts for 33% of these global sales, with 66 billion units of glass packaged alcoholic drinks sold across the region. China accounts for a large share of this demand, selling 47.5 billion units alone.

India ranks sixth globally, however its consumption of glass packaged alcoholic drinks rose by 7.5% compared to 2011, making it one of the fastest growing markets.

In contrast, more established markets such as Western Europe and North America did not register any significant increase in units sold, with Eastern Europe posting a 1% decline in 2012.

These trends generally reflect the worldwide economic situation: Tighter economic conditions (alongside growing health concerns) are affecting Europe and North America, whereas economic growth in India and Asia is enabling a growing middle class to afford such products. Alcoholic consumption on the whole is also becoming more acceptable in Indian culture. As well as the economic conditions, thick glass also lends itself well to regions such as India, Indonesia and Malaysia, where rough roads coupled with motorcycle transport require sturdier packaging than metal cans or PET bottles can provide.

With regards to type of beverage, glass is largely indebted to beer as it accounts for 74% of alcoholic glass packaging units sold worldwide, and 71% of sales in the Asia Pacific region alone. Wine accounts for 11% of global glass units for alcoholic drinks, with sales of sparkling wine increasing

by 3% compared to 2011. Cider is also a growing market for glass packaging, especially in the UK and South Africa. As for spirits, India as a nation of whisky drinkers is predicted to consume an extra 400 million litres over the next five years, a market where the glass bottle is essentially the only accepted packaging option.

LISEC: FILIP MIERMANS NEW HEAD OF MARKETING AND COMMUNICATIONS

Filip Miermans was appointed Head of Marketing and Corporate Communications of the LiSEC Group on August 1. He has thorough knowledge and many years of experience in communications



and marketing.

Prior to joining the LiSEC Group, Miermans was Head of Marketing and Communications at Miba (Laakirchen, Upper Austria). Before that, the native Belgian had held executive positions in marketing and communications at Heradesign (Knauf Insulation) and Ceratizit (Plansee Group).

Filip Miermans' main objective is to clearly position the LiSEC Group as a supplier of all-in-one solutions for the glass processing industry. He will focus his activities on "shaping the internal and external communication, and thus making LiSEC tangible as a strong brand". ■

(Glass News Source: World Wide Web)

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India.

Contact Nos.
+91 9927938063
+91 9024127692
+91 9219668446
+91 5612280841

Email: zulfiqar_ali_fzd@yahoo.com
upsalesfzd@gmail.com

Environment

TATA POWER TO SET UP 28.8-MW SOLAR PLANT IN MAHARASHTRA

Tata Power, through its wholly owned subsidiary, Tata Power Renewable Energy Limited (TPREL) would develop one of its largest photovoltaic based solar power plants with an installed capacity of 28.8 mw in the Satara district in Maharashtra.

Tata Power (Distribution), the distribution arm of Tata Power, has signed a power purchase agreement (PPA) for a term of twenty-five years in order to purchase power from this solar plant, thereby meeting its solar renewable purchase obligations (RPO).

The power generated will be evacuated through Maharashtra State Electricity Transmission Limited (MSETCL)'s network. The company intends to commission the entire project capacity by December 2013.

Tata Power group currently has a portfolio of 30+ mw of solar power. It commissioned 25 mw solar photovoltaic (PV) power project at Mithapur, Gujarat and 3 mw at Mulshi, Maharashtra. Its subsidiary Tata Power Delhi Distribution Ltd., has also commissioned a 1 mw grid-connected roof top solar plant in Delhi. A 60.48 KWP solar power plant has been functional on top of one of the building at its office in Carnac Bunder, Mumbai. The company proposes to add 50 mw of solar power capacity every year.

DELHI CAN MAKE HAY IN POWER SECTOR WHILE THE SUN SHINES

The national capital can generate over 2,500 MW of electricity using just 4.42 per cent of the total rooftop space available in the city.

As per the report 'Rooftop Revolution: Unleashing Delhi's solar potential' published by NGO Greenpeace, Delhi's rising power demand could be met by exploiting the solar power potential.

"The city can generate 2,557 MW by using 4.42 per cent of total rooftop space available for photo voltaic systems," the report, released by former Chief Justice of Delhi High Court A P Shah, said.

Currently, the city's gas and coal-based power plants have a total power production capacity of 1,345 MW against its daily demand ranging from 4,800 megawatt to 5,500 megawatt.

The report said prices per unit of electricity generated through solar power has come down by almost 50 per cent due to introduction of modern technologies and initiatives taken by the players in the field to make it more affordable.

Delhi's electricity grid infrastructure often collapses under the strain of excess loads. A project of 2 Giga Watt of rooftop solar photo voltaic systems will help stabilize the grid, it said.

The report claimed 62,000 new full-time jobs can be created through the installation solar panels having a capacity to generate 2 GW of electricity.

"Rooftop revolution is not just a report but a vision to realise Delhi as a green capital powered by clean and sustainable sources of energy like solar. What is required is political intent to convert this vision into a reality," said Anand Prabhu Pathanjali, energy campaigner, Greenpeace India.

The largest potential for solar power rests with residential buildings at 1.2 GW or 49 per cent of the total solar potential, followed by industrial buildings at 15 per cent, government buildings and public facilities at 13 per cent.

The report not only maps the potential and viability of the various building types falling under different tariff categories but also details business models and scenarios under which solar rooftop is advantageous.


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PANEL TO EVALUATE SAFETY OF PLASTIC BOTTLES FOR DRUGS

The government is constituting an expert panel to examine if plastic and Polyethylene Terephthalate (PET) bottles used for packaging pharma products are safe. The Drug Technical Advisory Board, the apex body on drug safety, has recommended in a recent meeting that a scientific expert committee should examine whether the use of plastic or PET bottle for primary packaging pose a risk to the public health.

Pharma companies are increasingly preferring plastic and PET bottles over glass containers to package cough syrups, antacids, vitamins as these are shatter proof, light weight and reduce wastage.

Civil society organizations such as Dehradun headquartered Him Jagriti have urged the government to completely ban plastic and PET bottles in case of at least primary packaging for pharma products citing studies that claim that leaching of plastic leads to contamination of stored products by releasing harmful chemicals from the packages, especially when these products are stored under harsh and variable temperature conditions.

"The use of PET and plastic bottles for pharma product poses immense risk to public health.

Our research from published sources shows that leaching becomes faster as temperature soars and packaging gets older. There are many scientific studies to prove that leached elements can cause several diseases including cancer," said Ajay Jugran, president of Him Jagriti.

Many chemical additives that give plastic its desirable properties are those very ones which can cause grave adverse impact on human health, he adds.

"This impact includes direct toxicity for instance in case of lead, cadmium, mercury. Other harmful chemicals that could leach from plastic packaging include carcinogens such as diethylhexyl phthalate," Jugran claimed.

Top pharma packaging companies say that drugmakers are supposed to use plastics, PVC material different from what is used for storing other inedible things like phenyl .

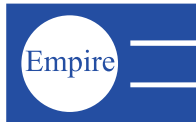
In India, the onus of getting the packaging right lies with the pharma companies, who are responsible for ensuring that the product and its packaging are safe. The pharma packaging industry in the country is estimated at around Rs 10,000 crore. Of this, plastics and PVC packaging market, is pegged at close to Rs 4000 crore. ■

(Glass News Source: World Wide Web)

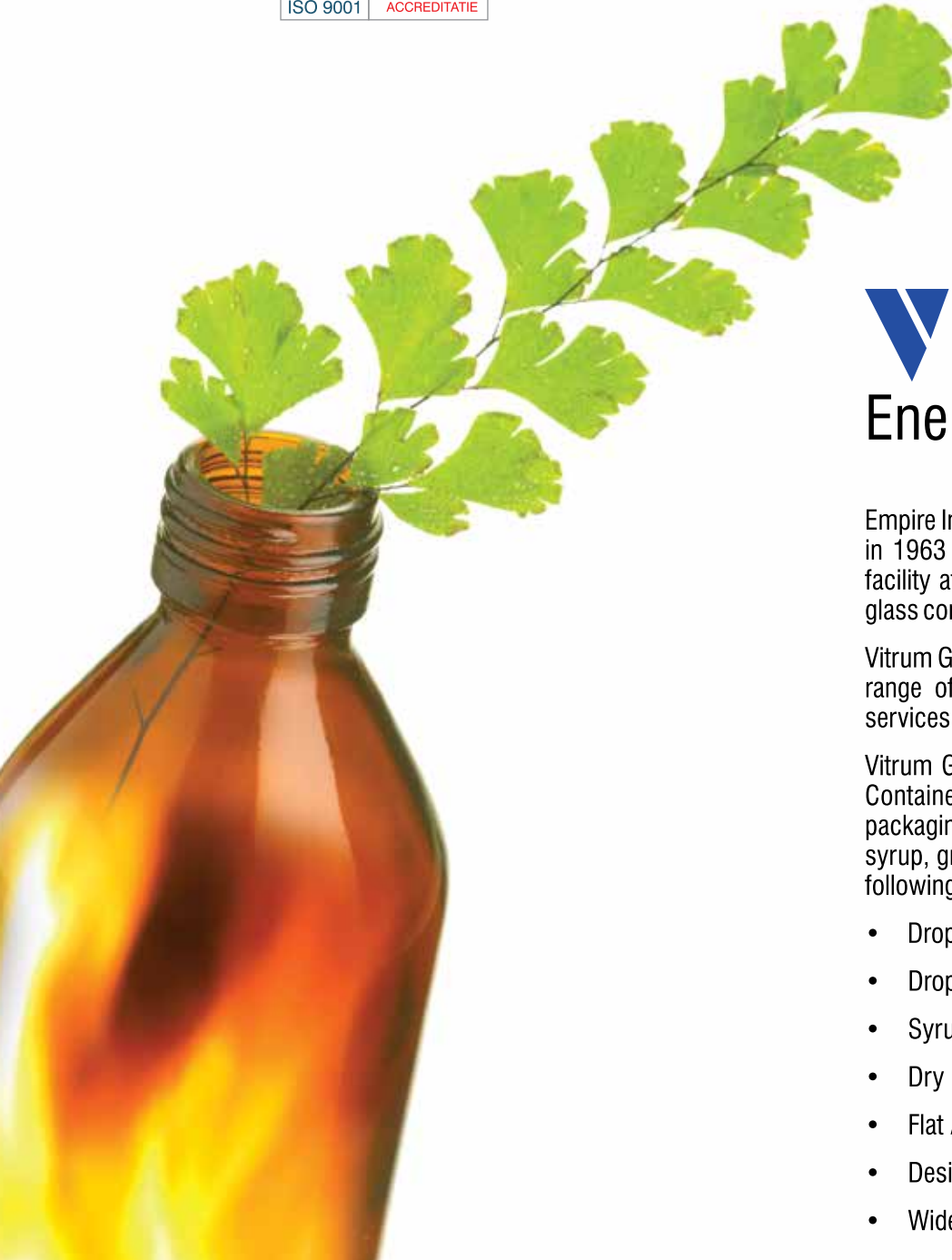
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Empire House, 414, Senapati Bapat Marg, Lower Parel, Mumbai, 400 013. India.

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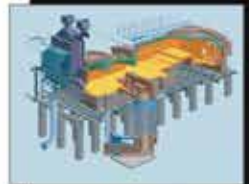
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Email info@mascot.in | www.mascot.in

