

Synopsis of Select Papers Presented in 13th



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Modern Automation Systems in Batch Plants and Cullet Recycling Plants

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Mr. Thorsten Zimpel, started with ZIPPE Industrieanlagen in year 1994 and has been working as a Process Automation professional for more than 25 years.

He is deployed in many countries for commissioning Automation Systems for Batch Plants.

Mr. Zimpel takes care of software developments for modern process control systems for Batch Plants and Cullet Recycling Systems. In addition, he has more than 20 years' experience in automation, data transfer to MES systems, PLC programming and weighing systems.

He masters several SCADA and DCS Systems from different vendors like Rockwell, Siemens, Schneider, Wonderware, GE, and is very experienced in SCADA systems and communication between different automation systems.

The presentation focuses on these control systems and covers the following:

- An overview of the different kinds of weighing systems and process control systems will be given.
- Here, system redundancy and safe network structures as well as remote service are of ever-increasing importance.
- Mobile apps are used around such a control system.
- Production data are stored and displayed in different charts. Dashboards and reports help you to improve productivity of your plant.
- You can display the important data on a computer screen or on a mobile device.
- By means of customized apps you can navigate to the different data you are interested in.
- In batch plants for the glass production there are different types of building and devices to store and feed different raw materials and cullet. Nowadays, this equipment and the material transport is controlled automatically.
- The information can be located locally or cloud based.
- You can access them from everywhere or just compare the performance of each plant.
- Control systems are constantly changing and new technologies are being introduced into the future plant automation. Automation and IT- structures are increasingly growing together.



SORG Forehearth Systems: The SORG 340S+® Forehearth and the SORG® Coloring Forehearth System

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2008–today Nikolaus Sorg GmbH & Co. KG

2016–today Nikolaus Sorg GmbH & Co. KG / Sales Manager Asia

For more than 40 years, SORG has a global reputation as a reliable partner for forehearth systems. Over the past decades we have consistently improved the technology and set milestones in forehearth engineering.

SORG has been developing forehearth technology continuously for decades. This enables us to provide the solutions our customers need for successful production. Technological advances, reliability, lower service costs and lower total cost of ownership. These are key factors of SORG forehearth technology.



In order to keep pace with the higher requirements customers have regarding glass conditioning, SORG has now improved on the 340S® forehearth. Its successor is the new **340S+®**.

The modified steel bracing shortens construction time as well. Each **340S+®** refractory superstructure cover plate is individually fixed. The insulation is partially protected with sheet metal covering.

Practical experience led to easier forehearth height adjustment. Instead of many single height adjustments, it is now possible to adjust the forehearth height at only two points in the front.

Principally the **340S+®** was designed that indirect air cooling alone will be sufficient. Direct cooling is foreseen in the refractory material and can be retrofitted on demand. This is enabled by combining it with the effective STW working end cooling which provides optimum forehearth entry conditions.

The largest modification from the 340S® to **340S+®** regards the cooling air supply. In new **340S+®** forehearths, the complete cooling air for all forehearth and working end zones, including possible bottom cooling will be served by only one fan – and not by two or even more fans as previously was the case. This fan is frequency controlled to ensure stable cooling air supply at different loads. Cooling air is supplied by a second redundancy fan.

SORG has delivered numerous factories worldwide – among them more than 1750 conditioning systems. By combining the know-how of our employees, the longtime experience of service staff and ongoing dialogues with customers, SORG has an exceptional position in the glass industry. Based on this, we successfully developed many products in the glass conditioning field which were established in the market during the past decades. Now we have improved the established 340S® forehearth to create the new **340S+®** generation. Of course, every SORG forehearth will be custom-tailored to the customer's specific requirements. The forehearth and all available options are available from one source, including excellent service and individual attention.

Glass Recycling – Potentials for Indian Glass Manufacturers

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1982 – 1986: University of Applied Science Nuernberg
1986 – 1988: Hertel AG, Fuerth, Design of standard and tailored end mill cutters
1988 – 1992: Nikolaus Sorg GmbH & Co. KG, Design Department glass furnaces
1992 – 1994: Wolf Montage Automatisierung, Project Manager
1995 – 2009: Nikolaus Sorg GmbH & Co. KG, Deputy Design Manager
2009 – today: EME GmbH, Area Sales Manager

With almost 100 years of experience, EME provides tailor-made solutions for batch and cullet handling in accordance with customer's needs and transfers unique process and technology know-how into state of the art plants for the glass industry. As a result of increasing demands and requests from our key customers to be involved as a strategic partner in glass recycling and sorting projects in the Asian market, EME is currently very active in this market. EME incorporates its expert knowledge and experience of batch and cullet processes and conditions into the cullet recycling concepts with special attention on reliable quality management as well as minimizing the environmental impact of spillage and dust emissions.

Potentials and challenges for Indian glass producers

The use of additional cullet from internal or internal and foreign sources has various benefits for glass manufacturers. For example, 10 % cullet addition results in approx. 2,5 % energy savings in the furnace, 10 % cullet addition reduces approx. 4 % NO_x, Six tons of recycled glass reduces approx. one ton of CO₂ emission, Lower amount of raw material consumption results in less spillage/less cost, and even more advantages. Due to these factors many European producers already use up to 80 % cullet in their furnaces. The specification of the input quality of the available cullet is of utmost importance to design and configure a tailor-made glass recycling plant. Potential contaminations can be bulk waste, organics, plastics, ferrous and non-ferrous metals, CSP (ceramic-stone-porcelain), lead crystal glass, heat resistant glass, opal glass and off-colours. The contamination levels have to be specified in g/to or ppm, as well as the grain size distribution. One of the main challenges for the Indian market is to configure the recycling plant to allow for varying input qualities. EME is additionally capable to evaluate cullet impurity levels at its test facility in Germany.

Glass recycling concepts and technologies

EME offers equipment for all steps of the cullet treatment process, including cullet preparation (handpicking, crushing, screening, drying), contamination removal (organic separators, ferrous separators, non-ferrous separators, CSP-sorters, heat-resistant and lead glass sorters), color sorting (flint-amber-green-other), fines processing through cullet pulverization technology.

All projects are designed and engineered in accordance with individual customer needs. The following machinery and equipment may be included in a glass recycling plant:

Manual sorters for bulk waste removal

- Screens (e.g. bar screens, linear screens, flip-flow screens)
- Crushers
- Organic separators

- Dryers
- De-labelers
- Magnetic separators for ferrous metals (e.g. overbelt magnets, magnetic drum separators)
- Eddy current separators for non-magnetic metals
- Optical sorters (e.g. 2-way or 3-way sorters; horizontal version with belt conveyor or vertical version with chute) - for CSP and off colors - for color sorting (flint-green-amber)
- Suction and filter system for dust, dryers and organics

In addition to standard offsite solutions, EME has specialized concepts for inline glass recycling plants that are integrated into the batch house process. These inline solutions have various advantages, primarily a higher quality can be achieved due to the elimination of additional contamination from external sources as well as reduced fines generation due to reduced cullet handling. Additionally, with direct integration and connection into the batch house and its control system, savings can be generated through shared operators, combined maintenance and cleaning routines and common spare parts.

EME capabilities for Indian customers to implement a tailor made cullet recycling system

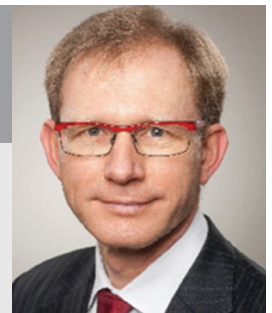
EME incorporates its expert knowledge and experience of batch and cullet processes and conditions into the cullet recycling concepts which will lead to a successful project concept development according to customer needs, engineering for general layout and project management, design and manufacturing drawings for supporting steel structure for local manufacturing, delivery of key equipment, selection of sub-suppliers for special equipment like sensor based sorting equipment, electrical control, project management for local sub-suppliers, installation etc. EME is your perfect partner for tailor-made solutions for your glass recycling and sorting project.

Fully Automatic Lines for Chemical Strengthening of Glass

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1995–1999, GLAMACO Maschinenbau GmbH, Project Engineer

1999–2012, GLAMACO Maschinenbau GmbH, Sales Manager

2012–2014, GLAMACO Maschinenbau GmbH, Managing Director

2014–Heute, GLAMACO Engineering GmbH, Managing Director

Everyone is using chemical strengthened glass products in his daily life – almost all cover glasses for mobile phones are made by this type of processing.

JSJ and Glamaco are offering the technology and machinery for fully automatic lines for chemical strengthening of glass. The chemical strengthening technology is highly recommended for automotive and architectural industry with respect to both reduced glass thickness and increased glass strength.

We are supplying complete solutions for fully automatic lines with a broad range of production steps such as:

- glass unloading from L-frame into machine rack (robot handling)
- chemical treatment of glass (fully automatic process)
- reloading of treated glass from machine rack into L-frame (robot handling)
- traceability of single products

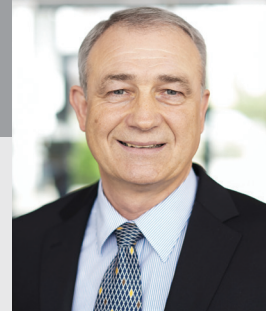
There are several projects worldwide which demonstrate the high reliability and effectiveness of our lines in many years of use. By cooperating with JSJ and Glamaco, Indian companies will have huge benefits such as:

- our German high-class technology
- our continuous innovations of production processes for high quality products
- long experience with successfully running production plants in India

Sophisticated Glass Handling and Processing in the Era of Industry 4.0

Jan Lukassek

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Mr. Jan Lukassek is a Mechanical Engineer.

Since 2004 Mr. Lukassek has been working at Grenzebach Maschinenbau GmbH in Hammar as a Sales Manager Glass Technology.

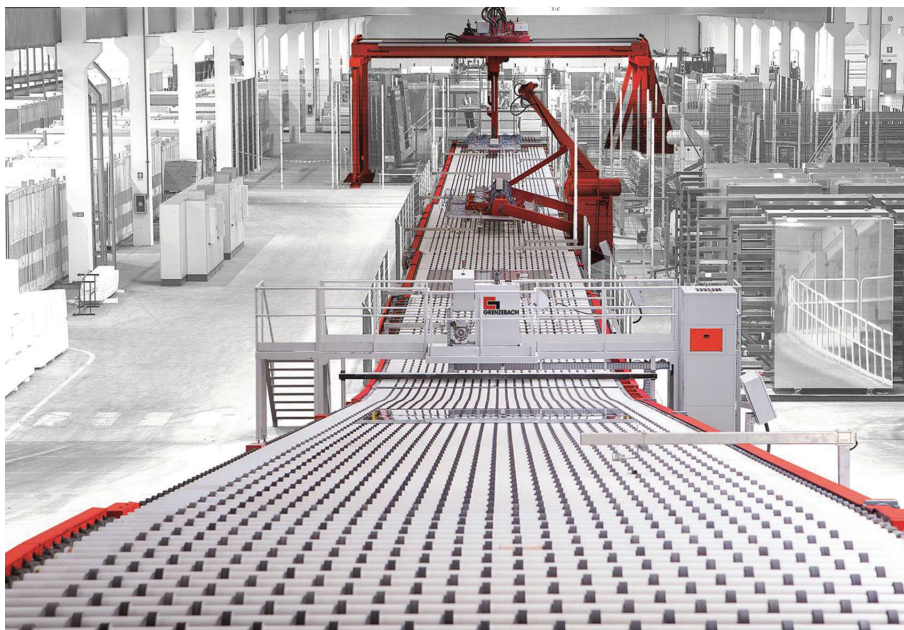
His responsibilities in BU Glass cover the sales area of Middle East and India.

He also has experience in sales of end-of-line packaging machines for the pharmaceutical and cosmetics industries.

The presentation showcases the Grenzebach Group as a leading specialist for the automatization of industrial processes. The company develops customized automation solutions from planning to manufacturing and commissioning for the global markets of the glass, building materials and intralogistics industry.

Flat Glass Production Technology

From lehr to warehouse the float cutting line is separated in several sections which need to be precisely connected to one another. Smoothly and safely glass transport, superior cutting and snapping accuracy and high speed and precise stacking technology distinguish Grenzebach.



Cold End Equipment / Transportation



Cutting



Snapping

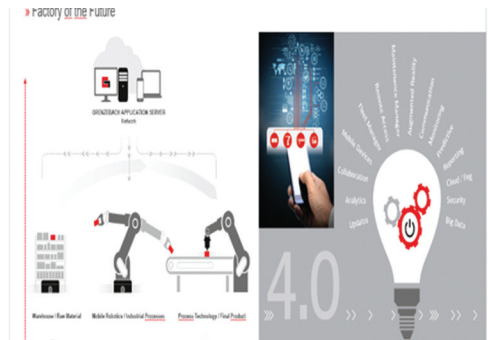
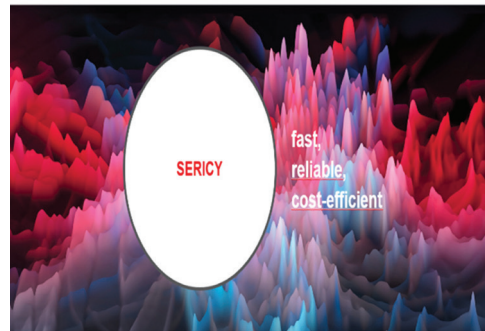


Stacking

More than 300 Grenzebach Float Lines are installed worldwide.

Digitalization / Industry 4.0

Further content is Sericy the newly developed IIoT platform for digitalization. Sericy is the enabler for any future production efficiency enhancement through digital information. A development of an Industrial IIoT platform by GrenzebachSericy is the



Digitalization / Industry 4.0

further content of this presentation. The IIoT platform is the basis for the development of own apps and allows users to shorten their development

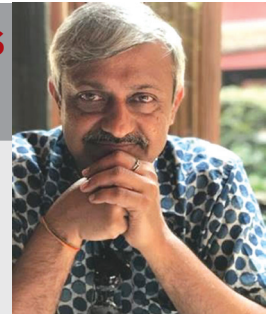
times significantly. In summary: the presentation will also show practical examples of how a leading solution provider tackles digitalization.

National Building Code: Glass and Glazing Aspects AND Emerging Regulations

Ar. Deepak Gahlowt

Hon. Adviser and Director, Confederation of Construction Products and Services AND Xebec Property Management Pvt. Ltd.

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Mr. Gahlowt is currently with Xebec, an integrated design-build-manage company that has delivered projects over more than 240 cities across India under three verticals - consulting, design and build, and facility management.

Other than starting Xebec, he has led and worked on developing and writing standards on safe use of glass in buildings for India; standardization of doors and window sizes; and has contributed to the Energy Conservation Building Code for India (ECBC). He was also the Convener of Confederation of Construction Products and Services (CCPS) for over 9 years.

An Architect and Member RICS, interest and experience in design, project management, historical conservation, sustainability, standards writing and building bye-laws drafting, advocacy, training, research and writing.

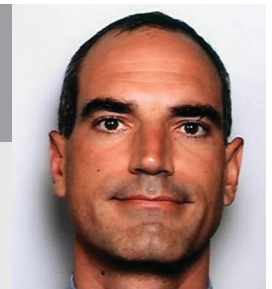
The objective of this presentation is to educate the entire construction value chain on the codes and provisions given in National Building Code 2016 on the use of glass and glazing systems in Indian Buildings and thereby enabling the implementation of the same.

Refractory Materials Challenges in Soda Lime Glass Feeders

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Ceramic Engineer, currently Marketing Director for Saint-Gobain SEFPRO.

Joined Sefpro in 1996, since then occupied several positions in Sales and Marketing.

“Corrosion process and potential glass defect formation happening in glass furnace feeder are critical issues since they are taking place in the last conditioning area before the final forming steps. Thermo-mechanical stresses play also a key roles in the life time of the complete forehearth.

We will discuss stresses and corrosion mechanism that refractory materials face in this particular part of the glass furnace and detail the specific environment for both glass contact and superstructure area.

We will discover how SEFPRO, supported by a wide range of fused cast and bonded refractory products can propose the optimized solution adapted to every glass maker constrain in term of glass quality, feeder lifetime and investment cost".

Energy Savings in Glass Making: The Importance of Correct Vacuum Setting

Rolf Hilfiker

CEO, Pneumofore

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Graduated in Economics at the University of Basel (Switzerland) and former President of the Young Entrepreneurs Group of the Industrial Employers' Association in Turin (Italy), Mr. Hilfiker has been serving Pneumofore since 2015 as Chief Financial Officer, at first, and Chief Executive Officer at present. He is the grandson of Jakob Hilfiker, who founded the company in 1923.

The glass manufacturing industry consumes a large quantity of compressed air and vacuum which are essential to drive the forming machines, improve the production speed and produce high quality containers. But when it comes to selecting the most appropriate pneumatic technology, "the more - the better" approach is not always the right choice, although very popular in many sales strategies of suppliers. Rather, high energy savings are possible by choosing the most efficient technology on the long run and a proper system configuration according to the real production needs.

Aesthetics and Functionality through Glass

Usha Batra / Dr. K M Soni

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Architects always look for a material which is aesthetically pleasing. At first sight, any person would like an aesthetically pleasing building, but for a person occupying the building with functionality is also important hence architects and engineers look for a material which passes through the test of aesthetics as well as functionality.

Glass has been in use for a long time and probably from the time when glass was invented and people realised the importance of aesthetics. Its use continued and would continue for ever. Initially it had limited applications in windows but now name any part of the building and any shape, glass can fulfill into the requirement.

Glass is a unique material due to various reasons and its properties. e.g., think for the transparency and one would immediately talk about glass. Glass is a material which brings outside view into your room whether panoramic view or otherwise. Due to solar light requirements in a habitat, glass becomes a necessity. In fact, without glass, it is difficult to imagine a human habitat. It may be store of dead materials or animal's natural habitat though the animals also prefer habitats with solar light and store also requires light to see without artificial light.

Another property of glass is transmission of light through it. At night, it provides a stunning effect from outside and inside both. Lighting, many a times also consists of glass.

If one looks for a material compatible to multiple kinds of materials, glass is one of the competitor nowadays. Traditionally timber (wood) and steel have been used with glass in windows and doors. In new and innovative buildings, aluminium, stainless steel, stones, concrete and PVC are finding use along with glass.



Looking through glass



Stunning lighting effect due to glass

And then, glass in itself has become a complete material for use in various components of a building. Various polymeric materials are also compatible to glass which are making glass safe whether in laminated or bullet proof glass. Thus safety glass is the product of marriage of glass with polymeric materials.

Glass has large functions in a building and in future it will find place even in roads in original construction as well as in rehabilitation. One cannot imagine solar power generation without glass. Structural glazing in facades, use of glass in windows and doors, roofs and walls, and now in interiors like floorings, staircases, railings, murals, partitions, and furniture are going to surpass the projected requirements of glass in future if it qualifies economic considerations.

Today world is looking for a material which can be recycled and glass qualifies this criterion too. Use of fibre glass is also going to take place in many engineering and household applications in future.

All types of glass cannot be used at all the locations and for all the functions. It has to be selected as per the requirements and tested for its properties. Unplanned and use of improper type of glass may create problems during fire, safety requirements and



Glass with wood and steel



Glass with concrete

handling and may cause severe accidents during disasters or otherwise hence glass must be used considering aesthetics as well as functionality by way of selecting proper type of glass. This requires awareness generation, training and education of glass properties, types and their uses. As large infrastructure is still needed, books and testing facilities at various cities should also be developed for creating confidence in use of glass in various applications.

Industry 4.0: A Pragmatic Approach

René Meuleman

Electric Business Leader Global Glass, Eurotherm by Schneider

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Mr. René Meuleman studied electrical engineering. In 1968 he started his career in the paper industry as a technical assistant, before switching to the glass industry in 1969 as an employee of Vereenigde Glasfabrieken. During his early

years, he built his broad knowledge and experience in design and development of electronic quality equipment for container glass manufacturing and was involved in the implementation of their first-generation PLC and DCS systems, as well as electronic timing systems for IS-machines.

Mr. Meuleman worked on several model based predictive control (MPC) projects, as well as being involved in object oriented engineering method developments. He became responsible for process control inside the BSN group and finally was responsible for the European plant process control and forming electronics inside the Owens-Illinois group.

10 Years ago, he left O-I and joined the Eurotherm by Schneider Electric group where he is responsible for the technical and commercial glass business development. Based on the Eurotherm and Schneider-Electric portfolio and together with his global glass business team he works on the development of innovative, pragmatic and competitive glass manufacturing process and power control systems.

Industry 4.0 is a name for the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Internet of things, cloud computing and cognitive computing.

It is no secret that the Glass Industry is very traditional, conservative and risk averse, but perhaps this is due to the fact that glass manufacturing is one of the most complex physical and chemical industrial processes around. It could profit greatly from data analytics because of this, but in most branches of the industry where margins are low, and products are considered to be commodity and investments rather than directly manufactured equipment, the related costs are hard to justify. To be fair, process control suppliers haven't introduced big innovations either and if we look at systems supplied 30 years ago, the difference is not that great. We all recognize that this has to change soon, simply because the industry faces huge challenges, for example, competition against plastics, introduction of new glass materials and remaining attractive to a young workforce, as well as energy related challenges such as reducing carbon emissions, the ability to cope with the energy market, finding the skill required to manage fossil fuel composition fluctuations and eventually converting to all-electric 'emission free' manufacturing. A change of attitude is required but 'change' needs to be justified, and data is what is needed to provide that justification. Some high-end glass manufactures are already investing a huge amount of money and resources into data analytics because the complexity of their process can no longer do without it. Others will need to follow, and we, the suppliers of this technology, have an obligation to keep it pragmatic and at an acceptable price level to enable glass manufacturing to remain competitive

Furnace Optimisation and NOx Reduction

Neil Simpson

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Mr. Neil G Simpson holds BEng (Hons) CEng MEI FSGT MIREfEng.

He is an Independent Consultant for Simpson Combustion and Energy Ltd and has worked with AMETEK Land for over 3 years on furnace and combustion optimisation projects.

"Before trying to reduce NOx it makes sense to optimise the furnace first! The AMETEK Land Cyclops portable pyrometer has, at least in my life, been one of the most reliable tools to use to optimise the thermal profile in the furnace. When AMETEK Land developed its in-furnace thermal imaging camera, NIR-B Glass, everyone was impressed by the visual image. What impressed me was that it is over 300,000 continuous cyclops temperature measurements. In this paper I will cover how the thermal data can be used to optimise the furnace and minimise NOx" ■