

Glass Industry 4.0 – automation and smart control engineering

How central are concepts such as Industry 4.0 – the “FOURTH INDUSTRIAL Revolution” – and Smart Factory among SMEs in the glass industry? Let’s have a glimpse at tomorrow’s processes which have partly become reality today and also at realities which are still a long way off in the future.

SMEs are at the very heart of German industry, and indeed its growth engine. They are the ones that drive innovation, creating both jobs and training places,” says the Federation of German Industry (BDI). According to recent BDI figures, the vast majority of VAT-paying companies are small or medium-sized enterprises. To stay competitive on an international level, it is therefore all the more important for such companies to accept the technical and organisational challenges of the future. And in the face of demographic change, it is equally vital for an enterprise to sustain and secure its long-term technical expertise. As many as 50% of Germany’s companies have understood the signs of the time and have largely gone digital now. The two keywords are Industry 4.0 and Smart Factory. On the other hand, however, 25% still cannot relate to this development. Small companies, in particular, feel that they simply cannot cope with the large number of overwhelming challenges – and indeed partly for financial reasons. The general picture that emerges across all industries can be applied one-to-one to SMEs in the glass industry. It should therefore be a major priority to show those companies the enormous opportunities they can tap into if they convert their operations and to help such enterprises overcome their insecurities.



Messe Düsseldorf GmbH
Postfach 10 10 06
40001 Düsseldorf
Messeplatz
40474 Düsseldorf
Germany

Telefon +49 (0) 2 11/45 60-01
Telefax +49 (0) 2 11/45 60-6 68
Internet www.messe-duesseldorf.de
E-Mail info@messe-duesseldorf.de

Geschäftsführung:
Werner M. Dornscheidt (Vorsitzender)
Hans Werner Reinhard
Joachim Schäfer
Bernhard Stempfle
Vorsitzender des Aufsichtsrates:
Thomas Geisel

Amtsgericht Düsseldorf HRB 63
USt-IdNr. DE 119 360 948
St.Nr. 105/5830/0663

Mitgliedschaften der
Messe Düsseldorf:

 The global
Association of the
Exhibition Industry

 AUMA
Messe-Ausschuss der
Deutschen Wirtschaft

 FKM – Gesellschaft zur
Freiwilligen Kontrolle von
Messe- und Ausstellungszahlen

Öffentliche Verkehrsmittel:
U78, U79: Messe Ost/Stockumer Kirchstr.
Bus 722: Messe-Center Verwaltung

The primary reason why there is so much scepticism is that although glass is produced in large dimensions and quantities, it is by no means a mass product. Today's glass, too, is in fact fairly smart, as multifunctional glass can distinguish light and shade, produce energy and control temperatures. In communication and consumer electronics tempered glass for smart phones and touch screens is more in demand than ever before. Thermally pre-stressed and functional glasses, for instance, require precise technical specifications, continuous quality checks and robust, reproducible production processes.

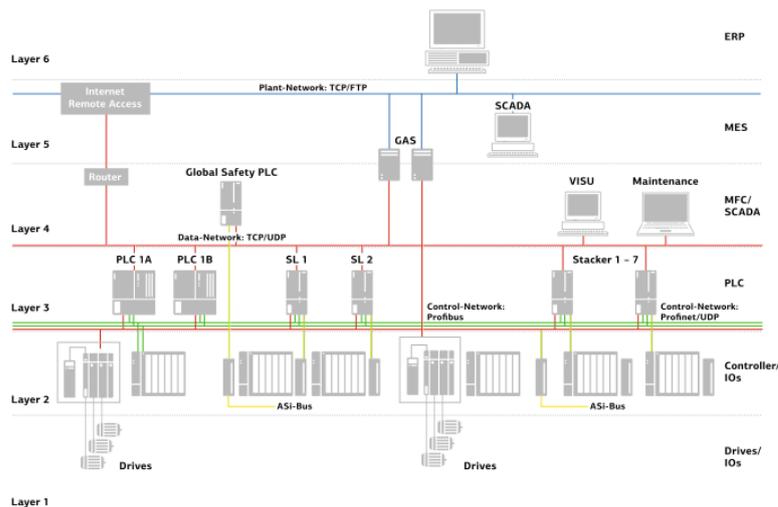
Industry 4.0 is a step into the world of cybernetics. Machinery turns into smart machines which control themselves, create networks among themselves and continually communicate with each other, i.e. they exchange data. This ongoing exchange enables machine systems to learn from mistakes and to avoid them in the future. Production improves during the actual process. The value chain is optimised one hundred per cent. Thanks to data networking between the various manufacturing routines, a smart system can warrant greater transparency and better safety in the creation of high-quality products. Smart factory for smart glass.



An example: Grenzebach

The challenge has long been tackled by software and mechanical engineering companies. These are the driving forces. One good example is the plant engineering company Grenzebach in Bavaria. Its automation solutions are fully comprehensive, including controls, networking and indeed the entire system right down to the cold end. It deals with all the processes and facilities that are relevant in the industry. Its continuous real-time analysis permits error forecasts and direct correction during the production process via the communication facilities within the actual system. This avoids costly, time-consuming interruptions and is especially

relevant to visual inspections and measurements which must be conducted to analyse and centrally report the glass quality in all sections of the plant. At the same time, customers can use the Grenzebach Application Server (GAS) to enter stages of their own manufacturing processes into the system and create processes of their own.



GAS at Grenzebach (source: press release of 30 July 2015)

Moreover, with its Grenzebach Secure Plants, Grenzebach has a fully comprehensive data security policy in place. This involves a combination of familiar technologies such as a firewall, system hardening, visualisation etc., and the customer receives ongoing support via a remote access facility.

Another example: A+W and Glas Nowak

The fact is that glass SMEs cannot simply adopt Industry 4.0 under the principle “one size fits all”. On the contrary, software developers and machine manufacturers need input from the glass industry: “There are no simple answers. All of us, including our mechanical engineering partners, need to look at the entire issue step by step,”² says Dr Klaus Mühlhans from A+W Software GmbH.

A+W has put this into practice with its supplier, the Austrian machine manufacturer Schraml and also with its customer, Glas



Nowak from Bochum-Wattenscheid. At the Wattenscheid plant horizontal CNC machining centres were replaced by vertical top drill M-RX drilling and milling centres. Schraml's machines, A+W's software and Glas Nowak's requirements were then combined, adjusted and recombined. In practice, the user simply scans in the code from the order slip, the data is passed on to the relevant parts of the machining centre, and the order is saved to the system as "done". If there is ever a mismatch between actual and target requirements, the machine and the software communicate with each other and attempt to find alternative solutions to continue the operations. This means that orders can be profitably mapped, even if the batch size is 1. Thanks to smart A+W interfaces, it became possible to digitally align the drilling and milling centres which were already running at the Wattenscheid plant, on the one hand, and the new machines, on the other, and then to integrate the latter into the existing system. The management of Glas Nowak has confirmed that their processes are now more reliable and more efficient. At the same time, however, they also emphasise that this would have not been impossible without close cooperation within the triangle of the customer, software developers and mechanical engineers.



The human element in the Smart Factory

Self-learning must not be equated with fully automatic, and it would be wrong to talk about rationalisation. In the future we will see the emergence of new job profiles – jobs that will play important roles and of which many are still waiting to be created. BDI is aware of this problem and has brought it to the attention of educational policymakers. There is a need for professionals who must be trained and supported within our own country. Maths, IT, science and technology must be made more attractive, particularly at school, and admission criteria at universities need to be lowered.

A responsibility for companies and government alike

But there is also a responsibility of companies to adjust their operations to the new challenges. The domestic glass manufacturer Zwiesel Kristallglas, which has its base in the Bavarian Forest, sees Industry 4.0 as the biggest opportunity to counteract demographic change and the resulting loss of expertise. Having embarked upon this path after 140 years of history, the company is now transforming itself into a self-learning production facility. In the medium term, changes in vocational training can be achieved through work-focused learning methods such as mobile e-learning (with PDAs and smartphones) or a company wiki which can be actively collected, shared and edited by the entire workforce. On-the-job learning is understood as an important ongoing process that does not end after three years.

Yet despite all positive aspects which Industry 4.0 can deliver for SMEs in the glass industry, there is one final point that must not be neglected: There are companies which are very willing to transform themselves and even have an affinity for Industry 4.0, yet this is often not an option for them because they do not have any fast and robust data connectivity. Here, too, the onus is on the government to promote broadband expansion. It is encouraging to see that the German Cabinet passed the Federal German Funding Programme for the Expansion of Broadband Access, submitted by the German Ministry of Transport and Digital Infrastructure (BMVI). German glass SMEs can only enter into fair competition and survive on the market if they can operate under the same technical networking conditions.

glasstec 2016, which will be held in Düsseldorf from 20 to 23 September, will highlight the various technical innovations that are or will be available in today's and tomorrow's glass industry and which will help to make glass manufacturing and processing even smarter and more efficient. This major international trade fair of the glass industry showcases the entire bandwidth, ranging



from small businesses to industrial glass processing, and covering flat, hollow and solar glasses as well as a wide range of special glasses. The issue of Glass Industry 4.0 will be addressed directly by exhibitors and will also be discussed at the Glass Technology Live symposium on 21 September 2016, under the auspices of the VDMA Glass Technology Forum.

Captions:

- *File: "Liquid_Grenzebach_Grafik_Glas-GAS Mai 2015.pdf": The Grenzebach Application Server (GAS) is the answer for the integration of customers' components and processes into the Grenzebach plant.*
- *"DSC_5864_b.jpg" and "DSC_5873_b.jpg": "I'll just scan it in ..." Using a barcode reader, the M-RX operator calls up the relevant data (measurements and processes) of the current disc on the A+W production monitor.*
- *"DSC_5876_b.jpg": SCHRAML technology in glass processing: This innovative mechanical engineering company has been trusted by NOWAK for 15 years now. All the interfaces are from A+W.*
- *"DSC_5889_b.jpg": CAD display for the M-RX operator on the A+W production monitor. The operator can now check the data and make any necessary changes.*
- *"DSC_5916_b.jpg": Fully integrated automation: a robot inserts the discs into a grinding machine. This improves throughput, is better for the operator's back and helps to ensure high quality.*
- *"DSC_5931_b.jpg": Automated order entry using the A+W CAD designer. This CAD system for flat glass also generates control data for the M-RX and other processing machines.*



Sources:

- **Interview: "Paving the way for Industry 4.0"**
Roland Jenning, Head of Research and Development at Grenzebach, about plant-wide automation which paves the way for Industry 4.0.
<http://www.industry.siemens.com/verticals/global/de/glasproduktion/seiten/interview-jenning.aspx>
- **Research for the energy-efficient industry**
<http://eneff-industrie.info/quickinfos/industrie-40/was-ist-industrie-40/context/32/>
- **Press Release: Grenzebach as a Smart Factory Pioneer**, Christian Herfert, Business Development Director, Research and Development, 30 July 2015
- ² **DIALOG A+W**
INFORMATIONEN ON GLASS AND WINDOWS, No. 56, October 2015, Editorial by Dr Klaus Mühlhans, A+W Software GmbH, Glass Market Development

- ¹ **Bundesverband der Deutschen Industrie (Federation of German Industry, BDI)**
- **Glas Nowak: SCHRAML M-RX with integrated A+W interface**
http://www.glas-nowak.de/fileadmin/Content/documents/news/News_AW_DIALOG_56_Nowak_Schraml_Artikel.pdf
- **Learning Production in Industry 4.0**, VDI Symposium 28/29 Jan. 2015, Dr Robert Hartel, Zwiesel Kristallglas, PowerPoint presentation
- **Glas Industry 4.0**, Timo Feuerbach Report on the Glass Technology Forum of the Research and Technology Industry Workgroup on 6 Aug. 2015, <http://glas.vdma.org/article/-/articleview/8664282#>
- **Siemens:**
<http://www.industry.siemens.com/topics/global/de/tia/Seiten/Default.aspx>

Daniel Krauß
Brigitte Küppers
Tel.: +49(0)211/4560-598 oder -929
Fax: +49(0)211/4560-87 598
E-Mail: KraussD@messe-duesseldorf.de oder
KueppersB@messe-duesseldorf.de



**Pressekontakt glasstec
2016**