

Case study:

Fully automated IG production

On the cutting edge of change

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Abstract

After implementing the cutting control system DynOpt in connection with HEGLA SortJet five years ago, long-term studies have not only confirmed the results presented here but it has become evident that due to the constant optimisation of the system which had been piloted then by Wolff+Meier Glaswerke, even better processes – and therefore savings – could be achieved, especially in the fields of

- maintaining defined sequences.
- minimising the material consumption
- saving of labour cost
- packing-optimised sequencing
- flexible cutting and easy addition of rush orders, remakes, and special glass types

At the same time, experience in other companies who are using a direct link between sorting line and IG line, are showing promising results. Moreover, we and our software partner ALBAT+WIRSAM saw additional saving potential by optimising the laminated glass cutting and improving the integration of the laminated glass stream in IG line loading.

Wolff+Meier therefore decided to adapt the original solution to the new, improved possibilities that have opened up by the refinement of DynOpt and HEGLA's technology.

Since this April, Wolff+Meier have taken the following optimisation and restructuring measures:

- direct link between HEGLA SortJet and the IG line
- up to three sheets in one Sortjet slot
- unproblematic production of triple IG
- integration of a HEGLA laminated glass Remaster in connection with a HEGLA ProLam in the laminated cutting area
- full integration of the laminated glass stream in the DynOpt control process – fully automatic, selective preliminary cutting of laminated glass and special glass types which, fully automatic as well – are added to the sorting buffer.
- Integration of a quality scanner into the IG-line

Direct link between the new Sorting system and the IG line

The new dynamic buffer with 250 slots represents a totally new product generation – both from the engineering point of view and with regard to ALBAT + WIRSAM's DynOpt software.

The most striking innovation is the direct link between cutting and the IG line (DynOpt streamline): The output shuttle directly

transports the individual sheets from the 250 slot, dynamic interim buffer right to the IG line, exactly in the right production sequence. While the original DynOpt solution already offered a largely automated stacking process, the entire logistics between breakout table and line entry is now fully automated. Less manual handling saves labour cost, shortens the process times and increases the quality by avoiding scratches and stains which can never be ruled out altogether with manual stacking on harp racks.

One slot - several sheets

A new, intelligent slot management permits multiple allocation of every single slot; this way, the actual capacity of the store exceeds 400 sheets.

More combination options improve the material utilisation by another degree. The multiple allocation of slots renders the system extremely flexible as the optimisation now has even more options.

The unloading shuttle can transport up to three sheets to the line simultaneously: This solution is therefore ideal for producing the much-in-demand triple IG.

In every IG production, a main target of

production control is to handle as many sheets as possible by means of automated processes; for a DynOpt solution, this means that as many sheets as possible should pass the dynamic storer. HEGLA and ALBAT+WIRSAM have achieved this by raising the maximum sheet size to 2,0 m x 3,0 m. Moreover, the store has been modified so that the SortJet can now also handle complex shapes. The share of the sheets processed via SortJet could thus be improved to an impressive 98%. The automatically controlled dynamic multi-slot allocation of SortJet buffer slots is unique, and is not offered by any other supplier anywhere in the world.

Fully integrated: The laminated float combined cutting line

HEGLA ProLam is a high-quality machine for industrial, high-volume applications. It also boosts preliminary float cutting and edge deletion of coated laminated sheets. Investing in this machine means that Wolff+Meier can now cut laminated sheets of up to a size of 4.6m. Shapes can be pre-cut on the preliminary float table.

Integration of a laminated glass residue plate store

HEGLA's Remaster storing and loading technology automatically stores the residue plates of the precious laminated sheets in a horizontal store. Controlled by DynOpt, the interim-stored residue plates are added real-time and as required to ongoing optimisations.

Set-up times for the removal and stacking of residue plates and manual loading are as good as unnecessary. This makes it possible to cut even a single sheet of a certain glass type, or just a single subplate – with little waste and minimum effort. This increases flexibility by another notch and improves the yield for real-time optimisation.

Integration of the laminated glass stream

By setting up the laminated cutting line on the corner of the Sortjet, the laminated sheets directly move to the store. The laminated glass stream is fully integrated in the DynOpt control process! DynOpt makes sure that float and laminated glass, received from different cutting lines, are available in the buffer in production sequence, without any manual intervention. Laminated glass has right of way regarding the supply: asynchronous saving of laminated glass sheets in a store permits undisturbed working at the laminated glass table.

Another advantage: The laminated glass sheets do not have to be lifted from the table but are directly transported to the store by means of an automatic set-up device. This requires just one operator at the laminated glass table – saving a considerable amount of labour cost (e.g. 1 operator per shift).

Patterned sheets and toughened glass are moved to the store at the float table.

Integration of a quality scanner into the IG-line

The Viprotron quality scanner IG, integrated into the IG line after the washer, detects faulty glass and issues a warning before the thermoplastic spacer is applied. All visible defects like scratches, dirt, finger-prints, etc. of a size over 0,2 mm are easily detected. The defective glass and its counterpane are removed from the line and appear on screen, with all relevant details.

What are the advantages of this new solution?

1. Improved production flow

The new ensemble of software by ALBAT+WIRSAM and HEGLA technology has made the production process fascinatingly orderly and consistent. Set-up times between production jobs are unnecessary as DynOpt creates an endless production stream. Due to the permanent, automatic loading, Wolff+Meier has achieved an even production flow plus constant, undisturbed loading of the line. ALBAT+WIRSAM direct packing at the end of the IG line can be used more frequently thanks to this regularity – saving time and allocation work in the shipping department.

Free aisles provide peace and clarity because almost no racks of glass are being moved around. The considerable set-up times for racks and harp racks at the laminated, float,



Fig. 02: Transported 'around the corner', the glass stream from laminated cutting is directly integrated in the sorting system. In the background: laminated glass Remaster.

Fig. 01: Direct linking of cutting and IG line: The sorting buffer's unloading shuttle passing on a sheet.



Fig. 03: A swivel conveyor sets the sheet onto the desired edge and transports the sheets from the cutting/ breakout table via loading shuttle into the SortJet slot determined by DynOpt. At the centre, the DynOpt control station - the "brain" of the entire system.



Fig. 4: The operator at the breakout table turns the sheet onto the reference edge and aligns it with a stop-per from where it is automatically transported.

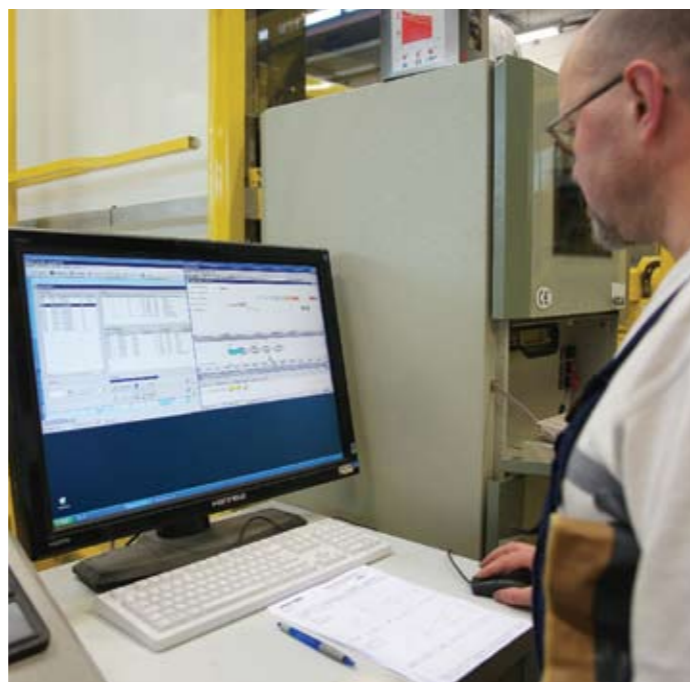


Fig. 05: The DynOpt monitor oversees the production which allows suit-able action to follow.

and IG line can be omitted. Based on breakage reports right at the cutting table, remakes can be cut immediately and automatically – hardly any order is delayed or incompletely shipped nowadays.

2. Saving potential - labour cost:

In the entire cutting and IG area, improved automation has helped to save 2 operators: 1 operator per shift at the laminated table (see above), 1 man per shift at the float table, and one operator at the line entry as only oversized sheets have to be loaded manually.

3. Saving potential - material:

The waste could be reduced considerably in the float, and especially the laminated glass section. As the sheets at Wolff+Meier are actually only transported on air cushions and roll-ers, there is less breakage. There are no scratches and stains to speak of as the glass is not removed from the table and loaded again and, as described above, does not have to be put onto harp racks manually. This results in less complaints – the whole package of measures has helped to increase the quality and delivery reliability and with this, customer satisfaction – an enormous asset which leads to long-term, cooperative customer relations.

4. Improved working conditions:

Last but not least, this solution helps to keep our employees in good health. Less lifting of glass and bending down to sort it into harp racks is required. Less manual handling of the precious but not altogether harmless material

naturally reduces the number of injuries. What can be better for a company and its team than staff that enjoys good health? Company physician, trade association and security person agree that this is a technology-based, positive development for the entire line of business.

Conclusion

Five month's experience with the enhanced system has brought even more saving potential. This has been supported by the following measures:

- Strong simplification and rationalisation of the interaction between cutting and the online-linked IG production
- About 98% of all sheets at Wolff+Meier are produced fully automatically, i.e. go through the SortJet

- Considerable competitive advantages thanks to the option of storing up to three sheets in one slot of the dynamic buffer
- Optimum conditions for producing triple IG
- Improvement of the yield for laminated glass by using the Laminated Remaster for production
- Sped-up production flow by automatic addition of laminated sheets to the production flow
- Direct packing at the end of the IG line
- Saving potential all in all: six-digit figures

Once again, Wolff+Meier have proved that a high degree of automation is worthwhile even for a medium-sized company – if it is scientifically designed, well thought-out by all partners and tailored to the customer's needs.



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