Machinery for Laminated Glass Production
Reliable processes, good quality, solid profit: LiSEC solutions provide flat glass processors around the world with security and drive in a challenging environment.

For the last 50 years, we have been working hard to enable you to sustainably boost the efficiency, the system availability and the quality output of your flat glass production process. Thanks to forward-looking thinking, continuously striving to find the best solution and a great deal of personal commitment from our employees, we have grown from a one-man company to a technology leader.

Our advanced solutions generate a great cost-to-benefit ratio throughout the entire lifecycle of your machines and systems.

Customers around the world can benefit from this: be they experienced manufacturers or newcomers to the industry; from family businesses to industrial glass processors. Three main factors are essential for long-term success:

1. Turn Key Solutions
Everything from a single source including software. Customers benefit from the only company in the flat glass machine industry that can comprehensively plan and develop large projects - also thanks to the widest product range in the industry.

2. Excellent Service
Investment security and the highest availability and productivity enable the large, global LiSEC service network. A contact person familiar with the local language and customs is available close to you.

3. Performance through software integration
Integration of the production management software and the machinery control (digitalization/Industry 4.0) allows top operation and optimization of all integrated machines or whole glass factories.

Facts and figures:
- 1961 founding year
- 1 strong brand
- 1,300 employees
- 25 sites
- 230 million Euros turnover (2017)
- 95 % export rate
- 7 % of turnover for R&D
- more than 330 patents

The benefits:
- Over 50 years of partnership, pioneering spirit and stability
- Investment security due to the size of our company
- Leading technology with a high resale value
- Great cost-to-benefit ratio throughout the entire system lifecycle
# Machinery for Laminated Glass Production

## Table of Contents

### Lines
- **ConvectLam 1**
  - Laminated glass line combined with a high pressure autoclave
  - p. 8
- **ConvectLam 2**
  - Laminating line combined with high-pressure autoclave
  - p. 12

### Software
- **prod**
  - Production Planning Software for the Flat Glass Industry
  - p. 18
- **assetcheck**
  - Machine Status Monitoring Software
  - p. 20
- **autofab**
  - Solution for Automatic Sorting Systems
  - p. 22
- **ident**
  - Information and Ready Messaging Terminal at the Production
  - p. 24

### Service
- **Services**
  - We offer you worldwide service and the fastest possible supply of spare parts.
  - p. 28

### Competence Center
- **LiSEC Glass Forum**
  - Competence Center for research, production and training in the field of flat glass processing
  - p. 30
We adapt the LiSEC lines to your production requirements. Combine innovative systems from the glass processing, glass cutting, tempering and logistics areas into a complete line system. Our employees are happy to advise you in order to configure tailor-made line solutions with you. In order to use the full efficiency of your production, cross-line software solutions are available.
**ConvectLam 1**
Laminated glass line combined with a high pressure autoclave

Proven quality meeting wide-ranging requirements. This insulating glass line is especially equipped for the production of coated insulating glass elements with various kinds of rigid spacers (aluminum, steel, stainless steel, plastic, hybrid). The assembly and gas filling press keeps both gas loss and cycle times low. At the end of the line, the sealing station ensures stability and above all perfect corners.

The ConvectLam 1 consists of the following individual components:

- Pneumatic tilting table
- Horizontal base washing machine
- One-piece positioning station
- Base glass converter
- Manual assembly (manual interlayer placement, interlayer cutting...)
- Interlayer unwinding unit
- 4-shaft infeed table at pre-lamination machine, with width and thickness measuring
- Pre-lamination machine consisting of preheating zone (optional) press 1, two main furnaces and press 2
- Hydraulic unloading tilt table

### Technical Data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass thickness</td>
<td>3 - 19 mm</td>
</tr>
<tr>
<td>Maximum unit thickness</td>
<td>100 mm</td>
</tr>
<tr>
<td>Minimum size</td>
<td>400 x 250 mm (2,600 mm, 2,800 mm)</td>
</tr>
<tr>
<td>Maximum size</td>
<td>2,600 x 4,500 mm, straight and U-shaped 2,600 x 5,000 mm, straight and U-shaped 2,800 x 5,000 mm, straight and U-shaped 2,800 x 6,000 mm, straight and U-shaped</td>
</tr>
<tr>
<td>Full storage</td>
<td>Up to 6 slots or interlayer unwinding unit on request</td>
</tr>
<tr>
<td>Previous machine</td>
<td>Preheating (optional) press 1, 2 pcs main furnaces and press 2</td>
</tr>
</tbody>
</table>

### Highlights

- Glass warms very homogeneously due to unique air convection system
- Precise adjustment of press force/press path due to servomotor controlled presses
- High positioning accuracy

### Options & Software

- Product tracking system
- Product labeling standards for laminated glass
- Automatic coating detection
- Measuring of actual press pressure
- Connection to ERP systems
- Turn-key package solution incl. clean room, autoclave, water treatment as well as loading and unloading via column-mounted slewing crane/lightweight top crane with suction lifts (chains or column-mounted) possible.
Glass warms very homogeneously due to unique air convection system

The uniform distance between upper and lower nozzles (regardless of product thickness) to upper and lower glass surface ensures that the glass is evenly heated.

Precise adjustment of press force/press path due to servo motor controlled presses

The double-sided electrical control of the presses with servomotors allows a fine adjustment of the presses.

High positioning accuracy

The positioning accuracy is +/- 1 mm at front and operator side edge.

Turn-key package solution

At purchase of additional equipment such as autoclave and clean room, we take on the entire coordination to provide a turnkey production for composite and laminated safety glass.

<table>
<thead>
<tr>
<th>Model</th>
<th>L (mm)</th>
<th>B (mm)</th>
<th>Operating pressure air (bar)</th>
<th>Operating pressure water (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConvectLam 1 2,600 x 4,500 mm straight *</td>
<td>40,000 mm</td>
<td>6,500 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,600 x 4,500 mm U-shaped *</td>
<td>25,000 mm</td>
<td>13,500 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,600 x 5,000 mm straight *</td>
<td>43,000 mm</td>
<td>6,500 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,600 x 5,000 mm U-shaped *</td>
<td>26,500 mm</td>
<td>13,500 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,800 x 5,000 mm straight *</td>
<td>41,500 mm</td>
<td>6,700 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,800 x 5,000 mm U-shaped *</td>
<td>26,500 mm</td>
<td>14,000 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,800 x 6,000 mm straight *</td>
<td>46,000 mm</td>
<td>6,700 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
<tr>
<td>ConvectLam 1 2,800 x 6,000 mm U-shaped *</td>
<td>28,500 mm</td>
<td>14,000 mm</td>
<td>6</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* Dimensions without clean room. Clean room size according to customer requirements.

** Height dependent on interlayer unwinding unit and feed.
ConvectLam 2
Laminating line combined with high-pressure autoclave

The LiSEC high-performance ConvectLam 2 is a flexible system with sophisticated technology that can be adapted to individual customer requirements. Compared to the ConvectLam 1, this line saves even more energy in the pre-lamination area due to the intelligent half-beam and full-beam system with width recognition. Additional features include non-contact interlayer placement and automatic interlayer trimming. The high-performance ConvectLam 2 is the best choice for the individual, optimized production of all common composite and laminated safety glass products in conjunction with a high-pressure autoclave. There are additional options available with this model.

The high-performance ConvectLam 2 is a modular laminating glass line that can be adapted to customer requirements in every respect. The base model consists of the following individual components:

- Hydraulic loading tilting table
- Infeed table into the horizontal washing machine
- Horizontal washing machine with options
- Outfeed table of variable size (can be used as buffer table)
- Positioning station with options
- Converter with options
- Assembly table with bays and electronically adjustable width correction
- Rough interlayer cut and additional buffer sections
- Interlayer unwinding unit for up to 16 interlayers or on request
- Infeed table pre-lamination machine (length can be optionally used as a buffer including width and thickness measuring)
- Pre-lamination machine with options, consisting of (optional) preheating zone press 1, two main furnaces and press 2
- Outfeed table VVB, optionally usable as a buffer
- Hydraulic unloading tilting table

### Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass thickness</td>
<td>3 - 19 mm</td>
</tr>
<tr>
<td>Maximum unit thickness</td>
<td>100 mm</td>
</tr>
<tr>
<td>Minimum size</td>
<td>400 x 250 mm</td>
</tr>
<tr>
<td>Maximum size</td>
<td>2,600 x 4,500 mm, straight and U-shaped</td>
</tr>
<tr>
<td></td>
<td>2,600 x 3,000 mm, straight and U-shaped</td>
</tr>
<tr>
<td></td>
<td>2,800 x 3,000 mm, straight and U-shaped</td>
</tr>
<tr>
<td></td>
<td>2,800 x 4,000 mm, straight and U-shaped</td>
</tr>
<tr>
<td></td>
<td>3,300 x 6,000 mm, straight</td>
</tr>
<tr>
<td>Full storage</td>
<td>Up to 16 slots or interlayer unwinding unit on request</td>
</tr>
<tr>
<td>Pre-lamination machine</td>
<td>Preheating (optional) press 1, 2 pcs main furnaces and press 2</td>
</tr>
</tbody>
</table>

### Highlights

- Energy efficient due to intelligent radiator heating convection system
- Glass warms very homogeneously due to unique air convection system
- Precise adjustment of press force/press path due to servomotor controlled presses
- High positioning accuracy
- Adaptable with additional software and additional functions

### Options & Software

- Washing machine: Optional with automatic brush lift
- Positioning station: Two-part drive for buffer function, speed assembly and tandem operation
- Converter: Optional variable suction lift
- Automatic, contact-less interlayer positioning especially for coated glass
- Automat. interlayer trimming
- Pre-lamination machine infeed table with cover
- Pre-lamination machine with eco heater (half and full radiator)
- Measuring of actual press pressure
- Turn-key package solution incl. clean room, autoclave, water treatment and loading and unloading
Energy efficient due to intelligent radiator heating convection system

The pre-lamination machine is operated with a full convection system. By heating up the radiators from approx. 25 °C to over 900 °C in less than 60 seconds, the heaters are only in use when glass is actually being processed in the pre-lamination machine. In addition, the system can switch to half or full radiator width based on the automatic width detection in front of the infeed.

Glass warms very homogeneously due to unique air convection system

The uniform distance between upper and lower nozzles (regardless of product thickness) to upper and lower glass surface ensures that the glass is evenly heated.

Precise adjustment of press force/press path due to servomotor controlled presses

The double-sided electrical control of the presses with servomotors allows a fine adjustment of the presses.

Turn-key package solution

At purchase of additional equipment such as autoclave and clean room, we take on the entire coordination to provide a turnkey production for composite and laminated safety glass.

<table>
<thead>
<tr>
<th>Model</th>
<th>L (mm)</th>
<th>B (mm)</th>
<th>Operating pressure air (bar)</th>
<th>Operating pressure water (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConvectLam 2</td>
<td>2,600 x 4,500 mm straight *</td>
<td>40,000 mm</td>
<td>6,500 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,600 x 4,500 mm U-shaped *</td>
<td>25,000 mm</td>
<td>13,500 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,600 x 5,000 mm straight *</td>
<td>43,000 mm</td>
<td>6,500 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,600 x 5,000 mm U-shaped *</td>
<td>26,500 mm</td>
<td>13,500 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,800 x 5,000 mm straight *</td>
<td>41,500 mm</td>
<td>6,700 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,800 x 5,000 mm U-shaped *</td>
<td>26,500 mm</td>
<td>14,000 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,800 x 6,000 mm straight *</td>
<td>46,000 mm</td>
<td>6,700 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>2,800 x 6,000 mm U-shaped *</td>
<td>28,500 mm</td>
<td>14,000 mm</td>
<td>6</td>
</tr>
<tr>
<td>ConvectLam 2</td>
<td>3,300 x 6,000 mm straight *</td>
<td>52,800 mm</td>
<td>6,700 mm</td>
<td>6</td>
</tr>
</tbody>
</table>

* Dimensions without clean room. Clean room size according to customer requirements.
** Height dependent on interlayer unwinding unit and feed
SOFTWARE

With our broad product portfolio we offer our customers a modular set-up, from single-user to complex group solutions with central administration and decentralized sales and production branches. Our whole team supports the development and service of our products, with the goal of generating the greatest benefit for our customers.
prod

Production Planning Software for the Flat Glass Industry

prod organises your production processes from the jumbo plate stock to the laminating process, the insulating glass production or any other kind of production process to the packaging of your products. The prod basic package already covers all main production planning functions relevant for the flat glass industry: production planning, scheduling, glass cutting optimisation, sequencing and remake management.

Extensions and additional products:
- Production planning and control system
- Material- und Maschinenoptimierung
- Dynamic optimisation
- Rack optimisation
- Label printing (grafical generator)
- Capacity planning
- Flexible reporting and analyses
- Delivery-/route planning
- Order management
- Process overview via asset check
- Integrated quality management
- Production status
- Control of LISEC and foreign machines

Interfaces:
- Bottero, Hegla, Intermac, Bavelloni, Bystronic, etc.

Highlights
- Overview of the running production
- Machine load and bottleneck warning
- Packing optimisation
- Stock location management
- Avoiding manual sorting
- Flexible reporting
- Simultaneous optimisation of multiple variants
- Remake management and integration

Functions
- Production planning and control system
- Material- und Maschinenoptimierung
- Dynamic optimisation
- Rack optimisation
- Label printing (grafical generator)
- Capacity planning
- Flexible reporting and analyses
- Delivery-/route planning
- Order management
- Process overview via asset check
- Integrated quality management
- Production status
- Control of LISEC and foreign machines

Overview of the Running Production

The sales department benefits from the capacity planning due to real-time information about achievable delivery dates. This is possible thanks to a comprehensive overview of the production process, even in areas where numerous production stages and material routes would make it complicated. Orders are planned with precision regarding schedule and machine-specific requirements.

Machine Load and Bottleneck Warning

prod reports the production progress to the plant management and the sales department in real time. The information tool provides an up-to-date status of the machine utilisation and individual orders. An invaluable advantage for a precisely planned utilisation of the production capacity or short-notice re-scheduling.

Packing Optimisation

prod makes it possible to produce glass sheets in optimised packaging sequence and directly onto the delivery racks. This makes time-consuming searching, commissioning and re-packing redundant. The results are reduced order cycle times, reduced costs in the shipping department and fewer glass damages during transport.
assetcheck is an indispensable component of the LiSEC product range. Machine status data are collected in real time directly by the machine’s control system and stored in a central place for displaying and analysing. If required, this information can be provided to the production manager, the quality manager, the board or everyone else, who needs them, everytime and everywhere on mobile devices (e.g. smartphones).

Through continuous determination of your performance data and the outcome awareness, you can promptly influence your production and therefore raise your machine availability and output.

Highlights
- Proactive planning of maintenance for reducing downtimes
- Point out and analyse downtimes
- Individually configurable
- Machine data available everywhere and real-time as alarms, cycle time, status, recipes, tool information, consumption data, production figures

Functions
- Display of actual machine status
- Generate your own views
- Display of past machine status
- View and analyse of alarm data, exit messages, downtime data, maintenance data
- Generate your own reports
- Pre-defined hit lists
- Reporting / charts / graphics
- Pre-defined reports as cycle time calculation per machine

Individually configurable
It is very simple to define different views with varying degrees of detail to meet the requirements of different users. It is possible to zoom in from a global overview down to detailed process parameters.

Analysis function
The collected data and messages can be analyzed using pre-defined hit lists as well as freely configurable reports. The creation of reports is supported by the integrated reporter module.

Current machine status display
The main indicator necessary for a quick overview of all machines is the machine status. At a glance, it is possible to see whether the machine is in automatic mode or if an error has been reported.
autofab is the heart of the automatic sorting and/or buffering solution. This solution allows online control of a completely automated glass production process. The system automatically connects to all machines, controls, regulates and supervises the production processes, and reports the current status of e.g. the sorting systems, etc. With the system it is even possible to separate cutting from production sequence. This way, glass waste is minimised and is guaranteed an optimum production sequence on an insulating glass line, a furnace, etc.

### Highlights
- Individual production sequences per machine
- The operator is informed about the current status
- Traceability over the whole production sequence
- Optimum utilisation of machines, buffers etc.
- Support of different sorting systems

### Functions
- Optimised sorting based on the working steps
- Automated handling of shapes
- Control of external software and interface of the industry
- Single glass sheets and batches can be unloaded combined
- Batch overview with further details
- Direct embedding of furnace and non LISCER machines
- Communication with scanner
- Connection to manual and automatic harp car system
- Control of laser applications

### Toughening Bed Load
Sheets are automatically optimised into a toughening bed, taking the furnace criteria into consideration. The furnace is automatically supplied with the sheets and the recipe data. After the tempering process the scanner and ripple data are automatically evaluated. Depending on the next processing step (delivery/IG), the individual sheets are automatically transported from the toughening bed to the correct position. Diverse tempering furnaces and scanning systems can be integrated.

### Loading Display
The loading display supports the operator loads the sheets onto the transport into the sorting system. The loading display shows all relevant information to load the sheets in the sorting system specified sequence, with the correct base edge and glass side.

### Traceability Over the Whole Production Sequence
The fully automated glass production records every glass sheet. Each production step can be retraced.

### Optimum Space Utilisation
The function „Chaotic Sorting“ allows an optimum use of the harp cars. With fully automatic control the production becomes more efficient and economical.
The main function of ident is to inform the user within the production about relevant details resp. to register remakes and ready messages and transfer the information to the ERP system. The program also supplies work step specific information (e.g. shape position) and generates control codes for machines from third party suppliers.

**Highlights**

- Paperless production list
- Ready messages to release capacities and actualization of the status e.g. for an order
- Remake messages for fast post-production
- Detail display for shapes and processings for error prevention
- Higher flexibility through real time adaptation at production planning

**Functions**

- Display of production drawings
- Entry of rack number and stock location
- Entry of remakes
- Online connection to processing machines
- Synchronising to other ident
- Material management
- Label printout (switching production / customer label)
- Status display
Machines and systems for flat glass processing are in use for many years, sometimes even for decades. Ongoing maintenance and optimisation are essential to keep performance, efficiency and availability at a consistently high level and to ensure high-quality glass products.
We offer you worldwide service and the fastest possible supply of spare parts.

From machine installations to modernization of existing systems, we offer a wide range of services, and stay on your side as a competent and reliable partner throughout the entire life cycle of your systems. Whether you need a customized training program, detailed machine inspections, online support, spare parts or upgrades – the LiSEC service team will take care of it for you.

**Services**

- Online Support
- Hotline
- Service / Maintenance
- Training
- Long Life
- Spare parts
- Installation
- Repairs

**Facts & figures:**

- 160 service engineers worldwide
- 28 branch offices/representatives
- Service for around 390 different machine types
- Approx. 4,700 customer locations in over 100 countries worldwide
- The largest global service network in the glass industry
- One-of-a-kind in the industry: Competence through operators’ know-how

**Hotline**

LiSEC attributes great importance to customer efficiency from the very beginning.

The company is now taking it to a new level of quality.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>CET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday - Thursday</td>
<td>07:00 a.m. - 04:30 p.m.</td>
<td>+43-7477 405-5701</td>
</tr>
<tr>
<td>Friday</td>
<td>07:00 a.m. - 12:00 a.m.</td>
<td><a href="mailto:aftersales@lisec.com">aftersales@lisec.com</a></td>
</tr>
</tbody>
</table>

**Online Support**

Preventive check-ups and maintenance ensure high plant availability, keep production output at the desired level and prevent unexpected plant downtimes.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>CET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>10:00 p.m. - 09:00 p.m.</td>
<td>+43-7477 405-5701</td>
</tr>
<tr>
<td>E-Mail:</td>
<td><a href="mailto:aftersales@lisec.com">aftersales@lisec.com</a></td>
<td></td>
</tr>
</tbody>
</table>

Emergency contact for urgent issues outside our working hours:

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>CET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday</td>
<td>6:00 a.m. - 10:00 p.m.</td>
<td>+43-7477 405-5701</td>
</tr>
<tr>
<td>Sunday</td>
<td>6:00 a.m. - 10:00 p.m.</td>
<td>+43-7477 405-5701</td>
</tr>
</tbody>
</table>
LiSEC Glass Forum
Competence Center for research, production and training in the field of flat glass processing

Facts and figures:
- Opened October 2015
- Latest LiSEC technologies
- 70 employees
- Investment: 7 million € since 2015
- 15 million Euros turnover
- Approx. 100 customer visits per year
- Glass storage with 96 rack positions
- 3 insulating glass lines
- 3 cutting lines for float, laminated and special glass
- Two AEROFLAT tempering furnaces
- Automatic sorting/shuttle logistics
- Planned ahead maintenance schedule
- Automatic production planning and machine addressing

The new LiSEC Competence Center for research, production and training in the field of flat glass processing was opened in Hausmening at the end of 2015. It aligns completely with the LiSEC claim „Best in Glass Processing“: The Competence Center „Glass Forum“ makes LiSEC the only machine manufacturer on the market who profitably processes flat glass. This operator know-how allows LiSEC to share and therefore fully understand their customers’ problems and challenges.

The „Glass Forum“, a LiSEC investment of approximately seven million Euros, accommodates the latest LiSEC technologies for each step of glass processing – from cutting and edge processing to a sophisticated sheet logistics system to the production of insulating glass units and laminated safety glass including tempering. In the Glass Forum, flat glass is processed under real life production conditions. The state-of-the-art plants and software applications are also used for research, testing and training.