

THIN GLASS | DISPLAY TECHNOLOGY | AUTOMATION | HANDLING | SERVICE



# Thin Glass and Display Technology

## High tech solutions have a name – Grenzebach



### Grenzebach stands for intelligent handling, processing and automation technology.

We design, manufacture and deliver complete systems as well as individual components for the manufacturing and processing of flat glass and building panels, for processing gypsum from raw material to finished wallboard and special equipment for cutting and drying veneers. Cleanroom capable automation solutions for the flat panel display industry is another core strength of the Grenzebach Group. As such we supply production lines for crystalline and thin film photovoltaic panels as well as joining and module lines for concentrator technologies (CSP and CPV). Grenzebach also offers process technology and automation systems for various industries as well as baggage handling equipment for airports and our Grenzebach FlightSim, the first robot-based flight simulator.

Various processes and optical quality inspection systems and a wide range of other products offered by our Service Competence Center complement our scope of supply. We develop, implement and integrate customized solutions for the automation and optimization of complex processes. Many years of experience in mechanical and electrical plant engineering as well as highly sophisticated plant controls, designed within the Grenzebach Group, guarantee optimum line functioning. Grenzebach offers solutions for all challenges in conveyor technology, flow of materials and intralogistics, supported by customized, high-performance control elements and components. Control technology, inductive technology, camera and inspection systems enhance our portfolio. Grenzebach places great emphasis on maintaining cooperative partnerships with its customers. With production facilities in Germany, the USA and China we are always close at hand. Our representatives provide on-site support and service around the world.

## A competent partner for thin glass handling challenges



### Leading global players count on Grenzebach's experience for line automation and employ our expertise to optimize production yield and throughput.

Thin glass handling requires a broad knowledge of glass with all its peculiarities, properties and processing requirements. The material is delicate but at the same time tough. With our expertise in float glass handling equipment and our knowledge of automation for complex production lines (such as solar panel production or logistics) Grenzebach can provide sophisticated solutions beyond automation.

Today, as manufacturing processes become more and more ingenious, the yield of fabrication lines depends more and more on appropriate material flow handling and product data collection.

Moreover, investors prefer well simulated production lines to eliminate potential risks before making their investment. With the extended capabilities in layout planning and simulating material flows Grenzebach has proven to be a highly reliable partner for top global players in the thin glass and display industry.

# Thin glass technology at its best



## Demanding requirements to the quality of thin glass products require a high degree of process accuracy and stability.

Grenzebach offers a multitude of production and handling solutions to satisfy the ever increasing demands of our customer's yield, quality and manufacturing cost related to thin glass products.

Due to its physical properties, thin glass is an essential part of today's industries with applications such as flat panel displays,

consumer electronics, automotive products and various architectural components. Consequently, innovative and reliable handling and processing technology is necessary to further the growth of these industries.

With its high standing in quality and reliability along with a history of innovation, Grenzebach can serve a multitude of different industry branches in the growing field of thin glass.

Because of many years of experience in supplying solutions into the float glass process, Grenzebach has a reliable solution in hand for thin glass manufacturing throughout the process, from the float through the coater.

## Grenzebach brings its vast knowledge in cold end solutions to the manufacturing of thin glass.

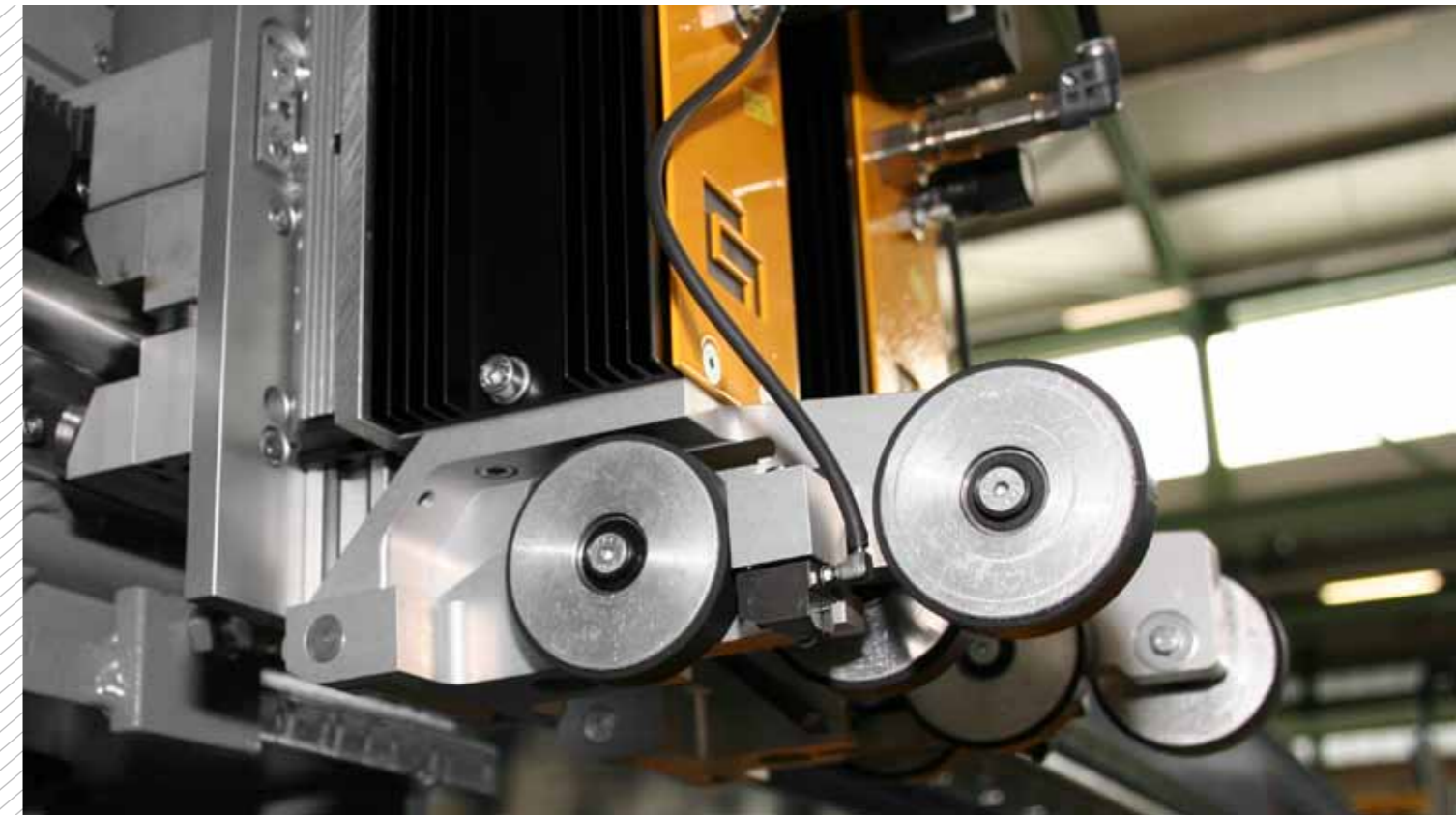
With a product portfolio that encompasses the entire thin glass production process. Our proven conveying and stacking technologies ensure a continuous and smooth handling of product and our robotic solutions for handling thin glass is an advanced and versatile alternative to traditional stacking solutions.

In order to guarantee continuous production flow, various buffering solutions are also available that can be integrated into your production line, from simple in line accumulation to cassette stations for high volume buffering.

Grenzebach's precision cutting technology along with patented optimization software brings the highest level of performance. Grenzebach also offers a complete range of machine controls designed to the specific application and customer needs to control all aspects of the production process with quick reaction to process changes that can help to maximize line output.

### Our scope of supply for the thin glass industry includes:

- Loading / unloading
- Glass transport conveyors
- Transfer tables
- Tilting units
- Rotating tables
- Lifting tables
- Alignment conveyors
- Robot handling
- Accumulators
- Buffers
- Cassette stations
- Control and automation systems
- Machine and line control (Siemens, Rockwell, Bosch, Schneider, Mitsubishi)
- Host computers
- Optimization
- 24 hour hotline support
- Whole line concepts
- Production optimization counseling



# Display your future



## Thin glass – delicate challenge, but not for Grenzebach.

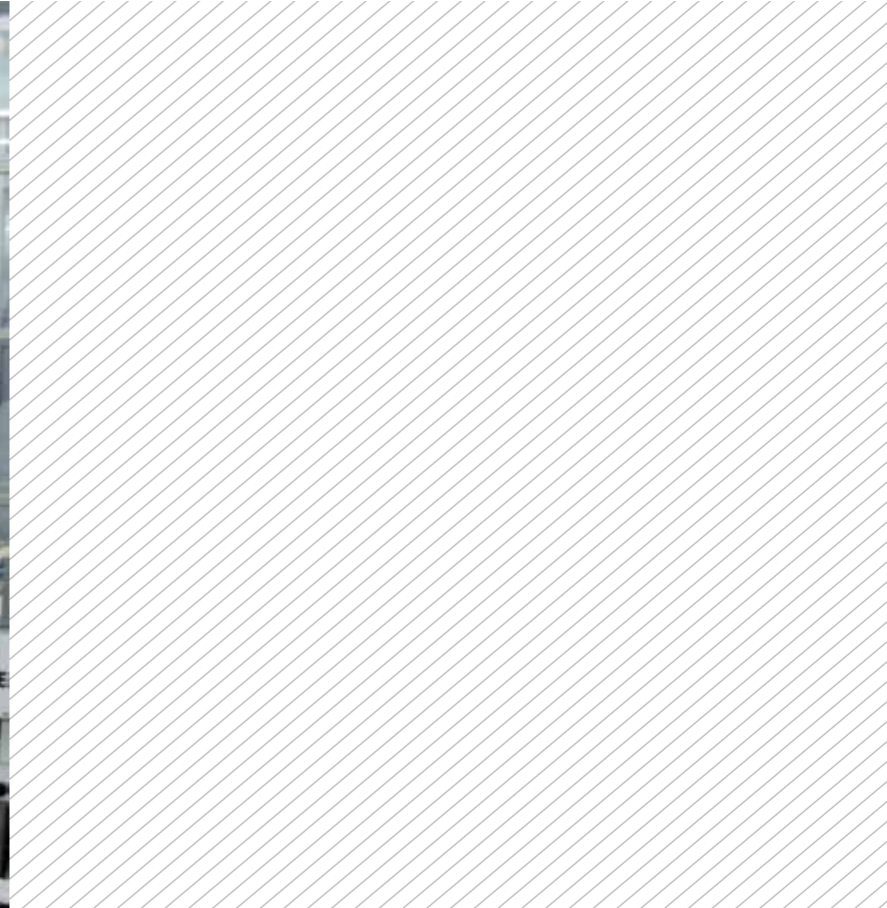
Today, flat panel displays are an essential part of our daily life appearing in virtually every format and offering a multitude of functions. None of these would be possible, however, were it not for thin glass!

While the production of thin glass and standard float are very similar and share similar machinery, it is necessary to consider different approaches due to the necessity of handling of thin glass in a clean room environment.

But as glass is our passion – Grenzebach has already proven its capability in this specific market with the supply of clean room capable automation solutions.

With the primary requirements for automation equipment in flat panel industry being high yield along with fast cycle times and clean room compatibility, leading flat panel display manufacturers have chosen Grenzebach as their supplier of choice due to our experience and reliability.

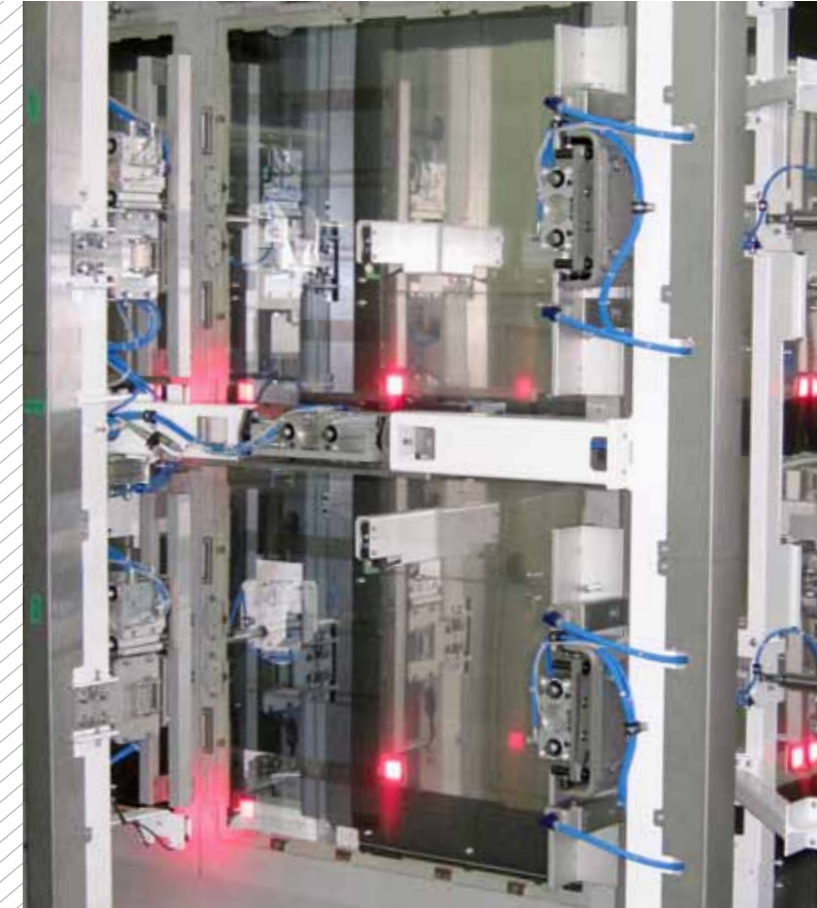
Grenzebach is an officially qualified clean room equipment supplier and a well suited player in today's flat panel industry.



## Innovation and reliability – for Grenzebach, a key to success.

**Grenzebach offers a variety of solutions for thin glass handling into the flat panel industry that meet clean room class 100 certification, including:**

- Robots for loading and unloading
- Different types for almost all glass sizes (16" x 20" up to 240" x 144" in load share mode)
- Performance between 2 pcs/min up to 7 pcs/min
- Flexibility to handle portrait and landscape orientation
- Flexibility to handle tin side or air side
- Conveyance solutions (conveyors, corner transfers, etc.)
- Fully automated carrier loading stations
- Clamping stations
- Handling and serving carrier magazines
- Buffer and accumulator systems (single substrates & batches, different glass sizes, typical design : LIFO)
- Material flow control and management systems
- Manufacturing executing system (MES)
- 24 hour hotline support
- Whole line concepts
- Production optimization counseling



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