

BENTELER

Glass Processing Equipment

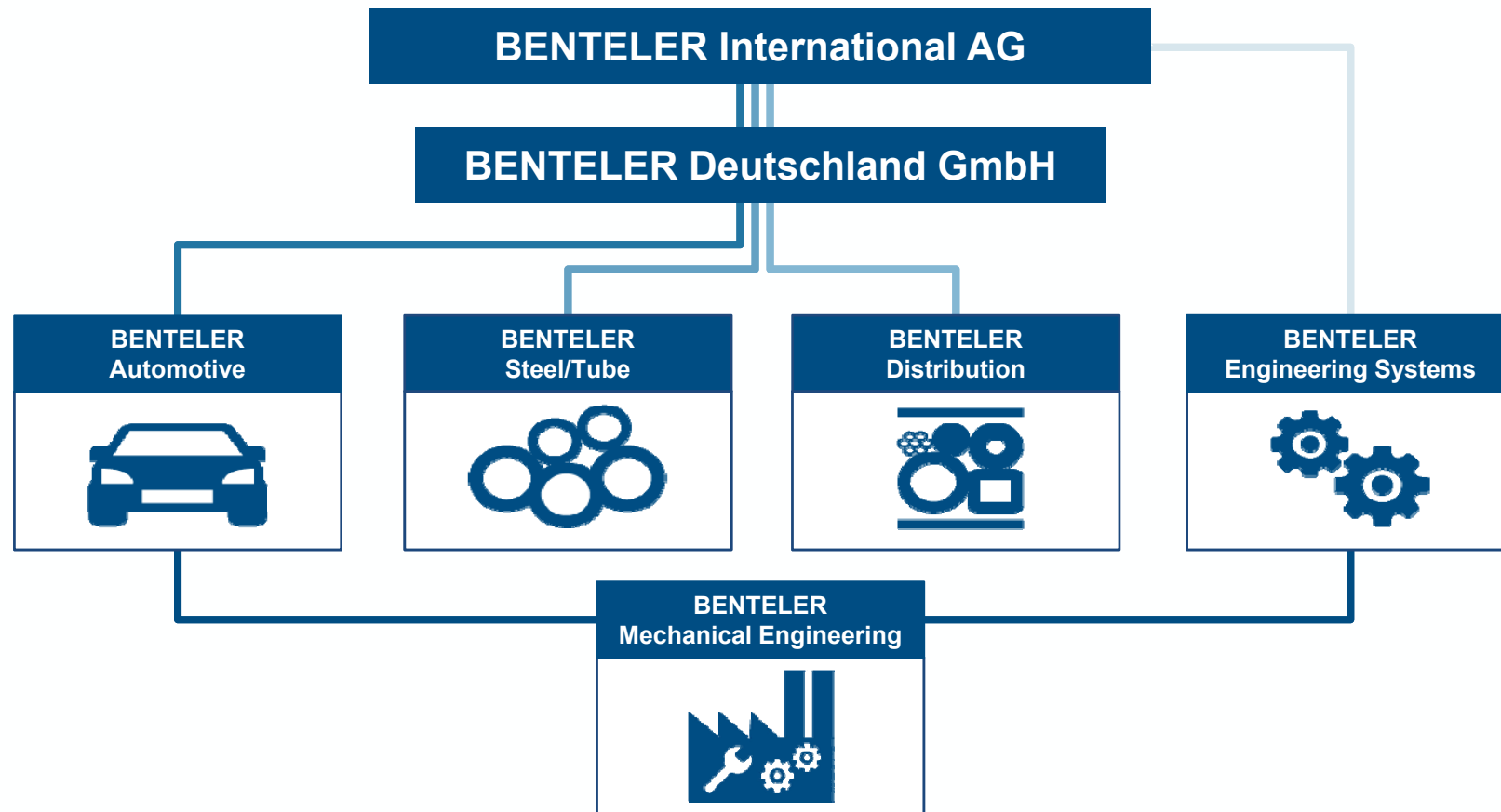
Location, xx 2015



Who we are

Our structure

BENTELER International AG



Our structure

BENTELER Mechanical Engineering

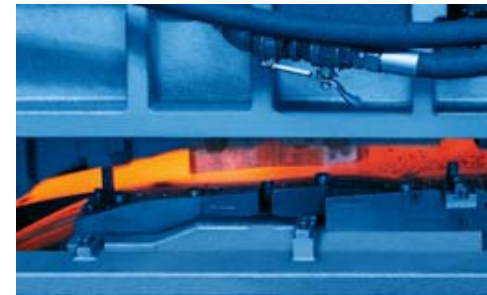
Glas Processing Equipment



Plant Engineering



Tool Shop

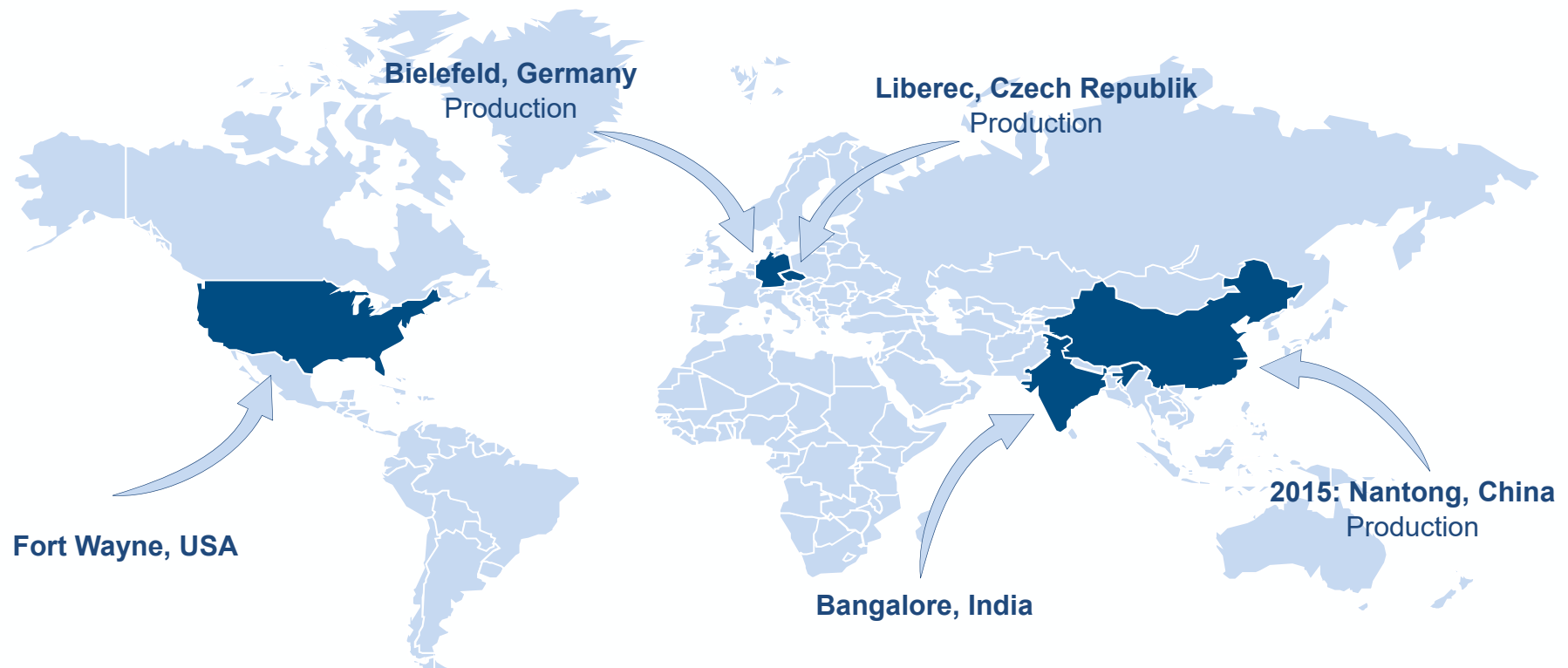


BENTELER Mechanical Engineering is an internationally successful supplier to the automotive and glass industry, and is subdivided into three segments

Our locations



BENTELER Mechanical Engineering



BENTELER develops and manufactures machines in two plants



Bielefeld:

(Glass, Plant Engineering, Tool Shop)

- Founded in: 1876
- Number of employees: 420 FTE
- Size: 26.478 m²
- Workshop size: 15.000 m²



Liberec:

(Glass, Plant Engineering)

- Founded in: 2001
- Number of employees: 110 FTE
- Size: 5.900 m²
- Workshop size: 5.300 m²



BENTELER

Glass Processing Equipment

BENTELER offers horizontal glass processing machines for the Architectural, Automotive, Solar and Display industry

Standard machines and customized solutions:



- Cutting
- Breaking
- Seaming Lines
- Grinding Machines
- CNC Processing Center
- Drilling Machines
- Laminating Lines
- Solar Module Assembly
- Automotive CBG-Lines
- Handling Systems
- Process Application Lines
- Washing Machines for flat and curved glass



Architectural



Automotive



Solar



Display

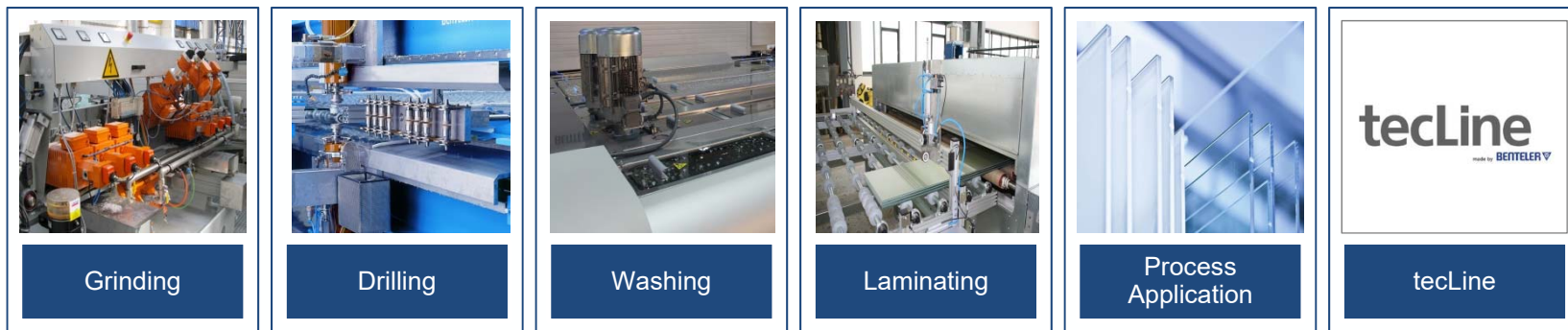


Architectural Glass

BENTELER has more than 60 years experience in developing architectural glass processing machines

Flat Glass Processing - Architectural

BENTELER builds since more than 60 years processing machines for architectural flat glass. Over the last few years, the requirements in glass processing have risen. In addition, the demands vary from customer to customer. Due to our long experience and the continuous development of all machines and systems, we can offer machines with a state-of-the-art technology, energy-optimized and in a proven quality. A sophisticated design and a reliable partner create the basis for a successful cooperation with customers.



Grinding Machines

Cup-Wheel Grinding Machine



- High-speed width adjustment
- Easy handling
- Optimized gap from glass to glass
- Low maintenance costs

Pencil-Edge Grinding Machine



- More flexible setup with large application range
- Precise width adjustment for exact positioning of the glass
- Completely encapsulated high-precision grinding spindles

Seaming Lines



- Short set-up times
- Precise edges
- Low tooling costs
- Nearly dry glass after seaming

One-Side Grinder



- No set-up times, idle and adjustment times
- Processing of different widths in direct sequence
- Processing of not rectangular glasses
- High and constant edge quality

CNC-Processing Center



- Very short changeover time
- Drilling, grinding and milling operations in one machine
- Easy and safe loading and unloading
- Laser sensors guarantee accurate positioning

Drilling Machines

Portal Drilling Machine



- Suitable for coated glass
- Automatic tool changer with up to 20 tools
- Maintenance-free drilling spindle
- Additional strong milling spindle

Twin Driller



- Simultaneous processing of small glass sheets in twin-mode
- Optimized cycle time
- Increases the output of the whole line

Multispindle Drilling Machine



- The solution for a fast and precise mass production
- High-speed water removal system
- Fast set-up time
- Up to 7 holes in one cycle

Portal Drilling Machine NC2



- Suitable for shaped glass
- Efficient for flexible drilling
- Automatic tool changer with up to 20 tools
- Maintenance-free drilling spindle
- Additional strong milling spindle

Washing Machines

tecWasher F



- Excellent washing and drying quality
- Small dimensions
- Low operating costs
- Simple and comfortable operation
- Easy installation

tecWasher compact



- Compact design for space saving
- Maintenance -free machine components
- Heated water-conserving cascading system
- Suitable for small glass sheets

Washing Machine Type 45



- Suitable for the float line, before glass coating and the glass processing
- Excellent washing and drying quality in front of the vacuum coating system
- Effective polishing units prepare the glass before coating

Coating Washer



- Excellent washing and drying quality in front of the vacuum coating system
- Effective polishing units prepare the glass before coating

E-Save-Washer



- Considerably low energy consumption
- Low noise level 70 dB(A)
- Integrated cleaning cycle
- Effective insulation for a high water temperature

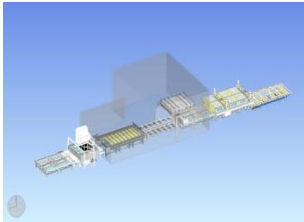
Vertical Washing Machine



- Simple process monitoring due to a high transparency
- Contour optimized drying nozzles
- Glass thicknesses up to 100 mm

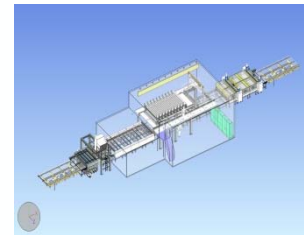
Laminating Lines

tecLami Line



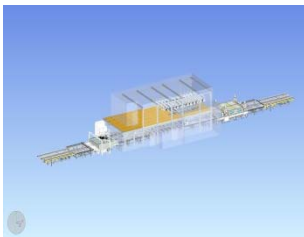
- Standardized line with expandability
- High process reliability
- Manual line for glass sizes up to 2.8x6.0m
- For all kind of glasses
- Basic PVB storage of 4-10 PVB rolls

Automatic Custom size Laminating Lines



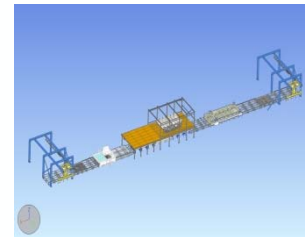
- Automatic or flexible semi-automatic production with high output
- Reduced personnel costs
- Reduced material costs
- Glass sizes from 0,6x1,4 m up to 3,3x9m
- Automatic PVB storage with 10 or 24 PVB rolls

Custom size Laminating Lines



- Constant product quality
- Suitable for cooled as well as foils with interlayer
- For all sizes of glass and special products
- Automatic production with high flexibility
- PVB storage with up to 24 rolls

Jumbo Laminating Line



- Full automatic laminating process
- Maximum output for standardized products
- Reduced personnel costs
- Automatic unloading of the autoclave racks
- PVB storage up to 12 PVB rolls

Process Application Lines

Mirror Coating Lines



- Entire line out of one hand
- Long term experiences
- Easy maintenance

Acid Glass Line



- Single vendor solution
- Modular design
- Flexible in configurations
- Process technology available on request

Solutions for fire resistant glass



- Handling application
- Cutting application
- Composite application

tecLine

tecWasher F



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- Small dimensions
- Low operating costs
- Simple and comfortable operation
- Easy installation

tecWasher compact



- Compact design for space saving
- Maintenance-free machine components
- Heated water-conserving cascading system
- Suitable for small glass sheets

tecGrinder



- High-speed width adjustment
- Easy handling
- Optimized gap from glass to glass
- Low maintenance costs

tecDriller NC2



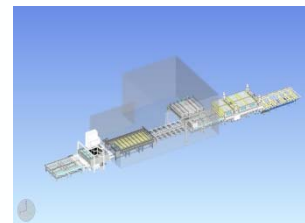
- Suitable for shaped glass
- Efficient for flexible drilling
- Automatic tool changer with up to 20 tools
- Maintenance-free drilling spindle

tecDriller



- Suitable for coated glass
- Automatic tool changer with up to 20 tools
- Maintenance-free drilling spindle

tecLami Line



- Standardized line with expandability
- Manual laminating
- For all kind of glasses
- PVB storage of 4-10 PVB rolls

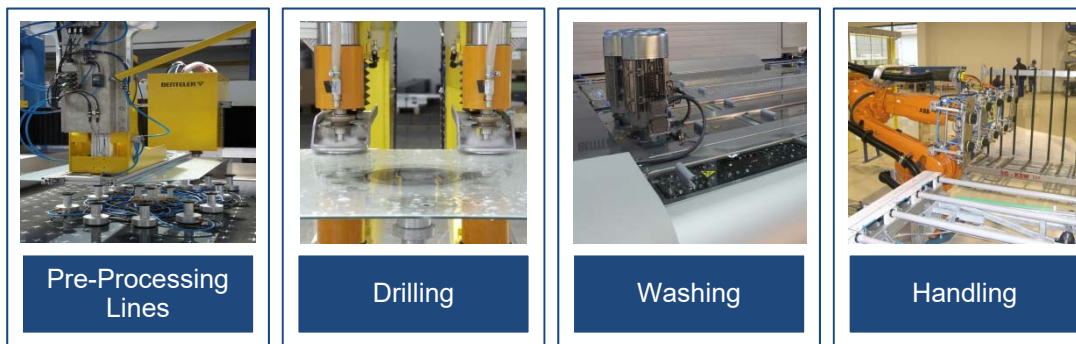


Automotive Glass

BENTELER offers individualized processing options for side-lites, back-lites and windshields

Flat Glass Processing - Automotive

For many years BENTELER has established itself as a supplier of automotive glass systems on the market. BENTELER delivers individualized processing options for side-lites, back-lites and windshields. A combination with our modular drilling and washing machines allow the creation of complete lines for customized turn-key solutions. BENTELER automotive glass lines are flexible and economical for high OEM quantity as well as for low aftermarket series.



Pre-Processing Lines

CBG Line



- High process reliability
- Line is extendable
- High processing speed

CNC-Processing Center



- Very short changeover time
- Drilling, grinding and milling operations in one machine
- Easy and safe loading and unloading
- Laser sensors guarantee accurate positioning

Drilling Machines

Multispindle Drilling Machine



- The solution for a fast and precise mass production
- High-speed water removal system
- Fast set-up time
- Up to 7 holes in one cycle

Washing Machines

tecWasher F



- Excellent washing and drying quality
- Small dimensions
- Low operating costs
- Simple and comfortable operation
- Easy installation

Washing machine for car top glasses



- Washing zone with cylindrical brushes for effective cleaning
- Conveyors are width adjustable for different glass dimensions
- High quality machine components

Washing Machine Type 45



- Suitable for the float line, before glass coating and the glass processing
- Excellent washing and drying quality in front of the vacuum coating system
- Effective polishing units prepare the glass before coating

Washing Machine for curved windshields



- Efficient cleaning before assembly and inspection
- Modular design for different speed options

Washing Machine for curved side-lites



- Universal machine for the reliable cleaning of curved side-lites
- High washing quality by specially developed processes

E-Save-Washer



- Considerably low energy consumption
- Low noise level 70 dB(A)
- Integrated cleaning cycle
- Effective insulation for a high water temperature

Handling

Inspection Lines



- Transport and loading systems
- Full automatic centering
- Vertical transport lines
- Loading and off-loading with robots

Assembly Line for windshields



- Transport lines and handling systems for the complete process
- Separation, washing, drying, assembly, foil cutting, spot welding, turning and saving

Trimming



- Automatic foil trimming for laminated windshields, side-lites und back-lites

Paper cutting



- Stacking of side-lites
- Automatic cutting of paper sizes
- Automatic paper roll change

Loading and off-loading oven



- Stacking with robots
- Automatic spacer supply
- Automatic oven loading from glass racks
- Oven off-loading with integrated measuring systems



Solar Glass

BENTELER offers equipment for pre-processing and module assembly

Flat Glass Processing - Solar

In 2007 the division Solar is emerged from the division Architectural Glass. Benteler develops and supplies innovative concepts for Solar glass processing. The foundation of our success is our creativity in system planning and machine development. The result is an improved and optimized manufacturing process, giving our customers a competitive edge in the market.



Grinding Machines

Pencil-Edge Grinding Machine



- More flexible setup with large application range
- Precise width adjustment for exact positioning of the glass
- Completely encapsulated high-precision grinding spindles

Pencil-Edge Grinding Machine GenII



- High availability
- High process reliability
- Integrated suction system for a dry grinding process

CNC-Processing Center



- Very short changeover time
- Drilling, grinding and milling operations in one machine
- Easy and safe loading and unloading
- Laser sensors guarantee accurate positioning

Drilling Machines

Portal Drilling Machine



- Suitable for coated glass
- Automatic tool changer with up to 20 tools
- Maintenance-free drilling spindle
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Multispindle Drilling Machine



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E-Save-Wahser



- Considerably low energy consumption
- Low noise level 70 dB(A)
- Integrated cleaning cycle
- Effective insulation for a high water temperature

LAB Washer



- Excellent washing quality for various application cases
- For each requirement the right solution due to a modular design
- Washroom completely made by synthetics

Assembly Equipment

Railbonding



- High process reliability
- Modular design

Edge Sealing



- High working speed
- Modular design

Foil Management



- Automatic laser measurement
- High cutting speed
- Automatic wind-up device for interleave foil



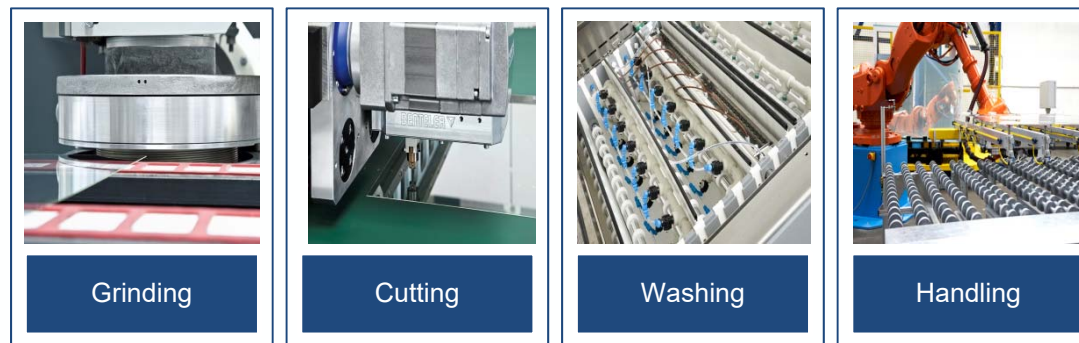
Display Glass

BENTELER offers this challenging market a wide-range of innovative equipment and solutions.

Flat Glass Processing - Display

In recent years there has been a new development in flat glass application. Thin glass processing takes place under this latest technology. The glass is precisely cut, the edges processed, and it is cleaned after each step.

BENTELER offers this challenging market a wide-range of innovative equipment and solutions. The BENTELER glass processing machines were developed to be adaptable to different standards and customer requirements.



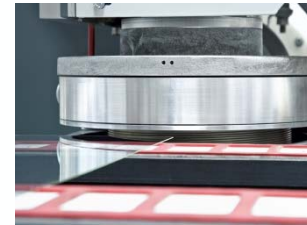
Cutting and Grinding

Cutting and Breaking



- Linear measuring systems guarantee perfect cutting results
- Extraction of glass particles at all critical processes
- Cleaning of the cutting support belt after each cutting process
- Careful cutting and breaking process guarantees optimal edge quality

Grinding and Polishing



- High-precision grinding and polishing of Display Glass
- Minimized glass removal for an optimal edge quality
- Semi-automatic tool change
- Automatic tool measuring
- Automatic wear compensation
- Automatic tool sharpening
- Absence of cooling water on the glass surface

Washing

Cleaner Type 45c



- Compact design
- Stainless steel AISI 304 or 316L
- Close roller distance for excellent glass support
- Drying section with optimized design for ultra-thin glass
- Maintenance-free machine components
- Low water consumption

LAB Cleaner ECO



- Washroom completely made of synthetics
- Standardized configurations for different applications
- Optional polishing sections
- Detergent dosing
- Designed for cleanroom production

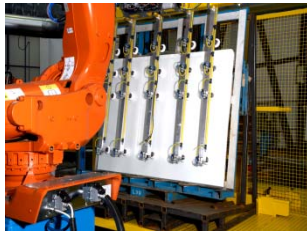
LAB Washer



- Highest washing quality for special applications
- Customized configuration through modular design
- Optional polishing sections
- Optimized for pre-coating conditioning
- Detergent dosing
- Designed for cleanroom production
- Integration into complete production line
- Modern control with touch-screen and advanced visualization

Handling

Paper Application

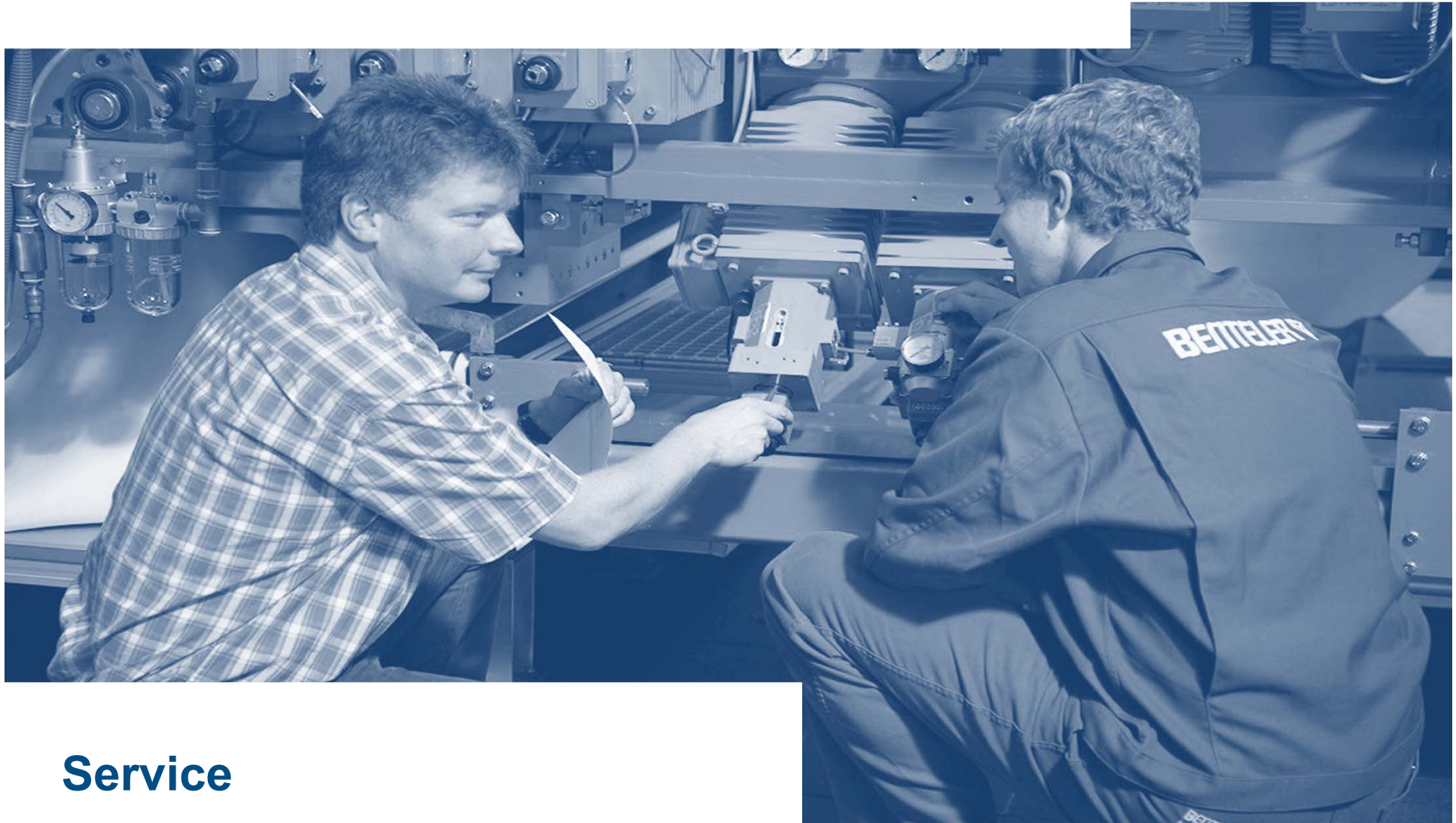


- Stacking with automatic paper interleave
- High flexibility for different glass sizes and paper thickness
- Automatic paper roll change without interruption
- Fast operation for maximum output
- Uninterrupted stacking due to turning table
- Paper ionization => Vertical or horizontal glass stacking

Destacking



- Intelligent interleave paper removal (aspiration or mechanical disposal)
- Sophisticated grippers for large, thin glass panes
- Any kind of handling device possible (robot, gantry, underfloor stacker)
- Turn-key line solutions including transport devices, tilting tables



Service

BENTELER offers an outstanding Service to fulfill different requirements

BENTELER Service

The BENTELER Service is a synonym for comprehensive technical competence and reliable support. We ensure a high availability and we react quickly and flexibly. Due to our distinctive process know-how and our long-term experience, we are a competent partner for the technical service of your equipment. Ranging from machine maintenance, through relocation of machinery and remote service, to our spare parts service and telephone support: we offer the complete service from one source.

