

**MiniTec**  
SOLAR TECHNOLOGY



*...save time!*

## THE COMPANY



### **The Company**

MiniTec was founded on the sales of miniature linear guides and has successfully evolved into designing complete machines and devices for many industrial processes around the world.

### **The Production Program**

Our linear technology combined with the Profile System is the ideal partnership for machine builders. The components work together to provide optimum performance and the modular assembly system makes it possible to design and manufacture to unique specifications quickly and cost effectively.

### **The Quality**

To meet the demands of linear technology precision and exceed quality expectations, we invest in the latest machines and newest technologies and manufacturing techniques. Our quality management has been certified according to ISO 9001 since 1994.

### **The Environment**

Our Company mission stresses an active role in environmental protection and the conservation of our natural resources. As an example we locate our service partners in close proximity to our customers to avoid long transits. Our environment management system is certified according to ISO 14001.

### **The Occupational Health and Safety**

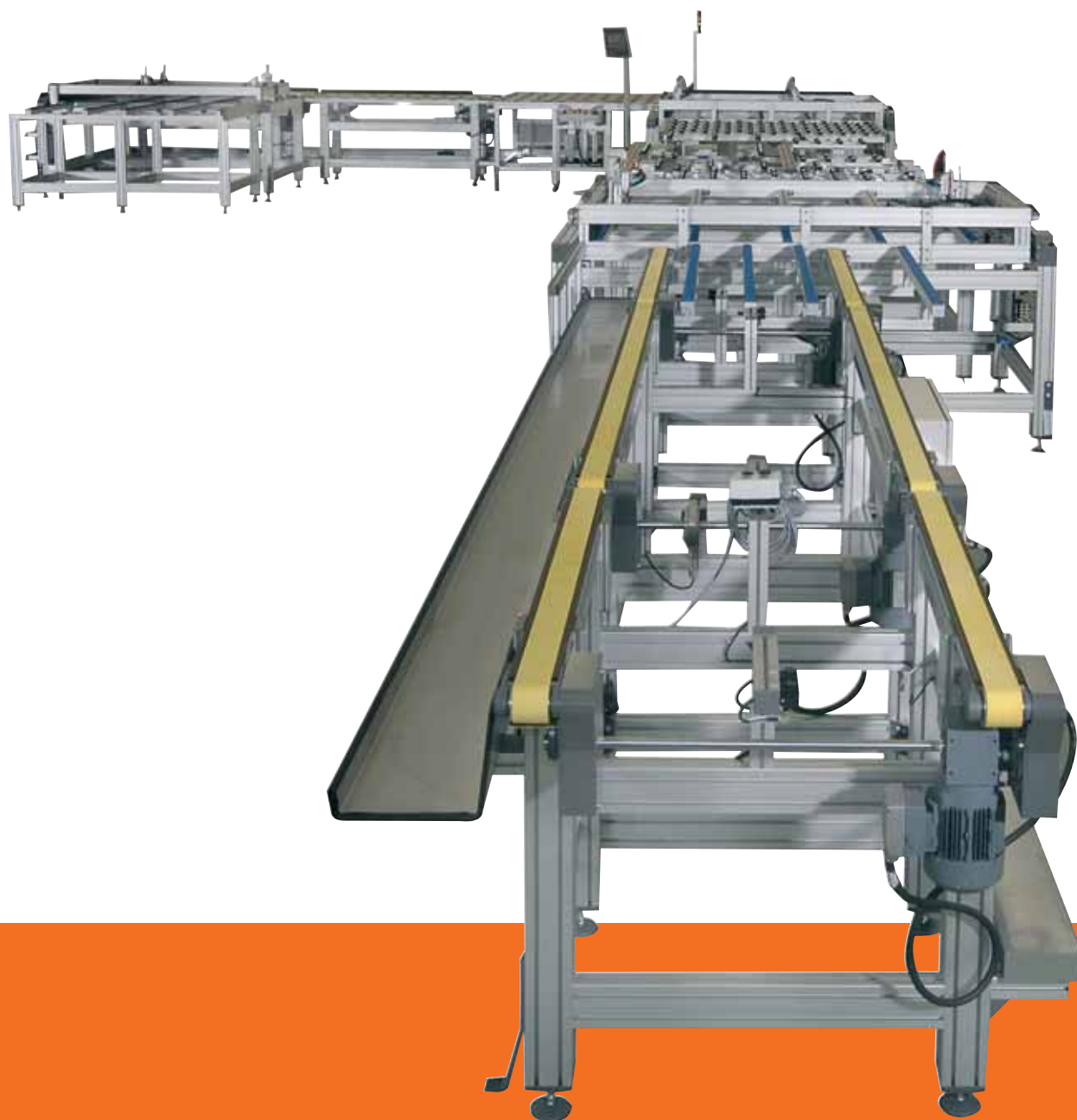
Since 2006 is our company certified with the OHSAS 18001 – Occupational Health and Safety Assessment Series.

### **The Innovation**

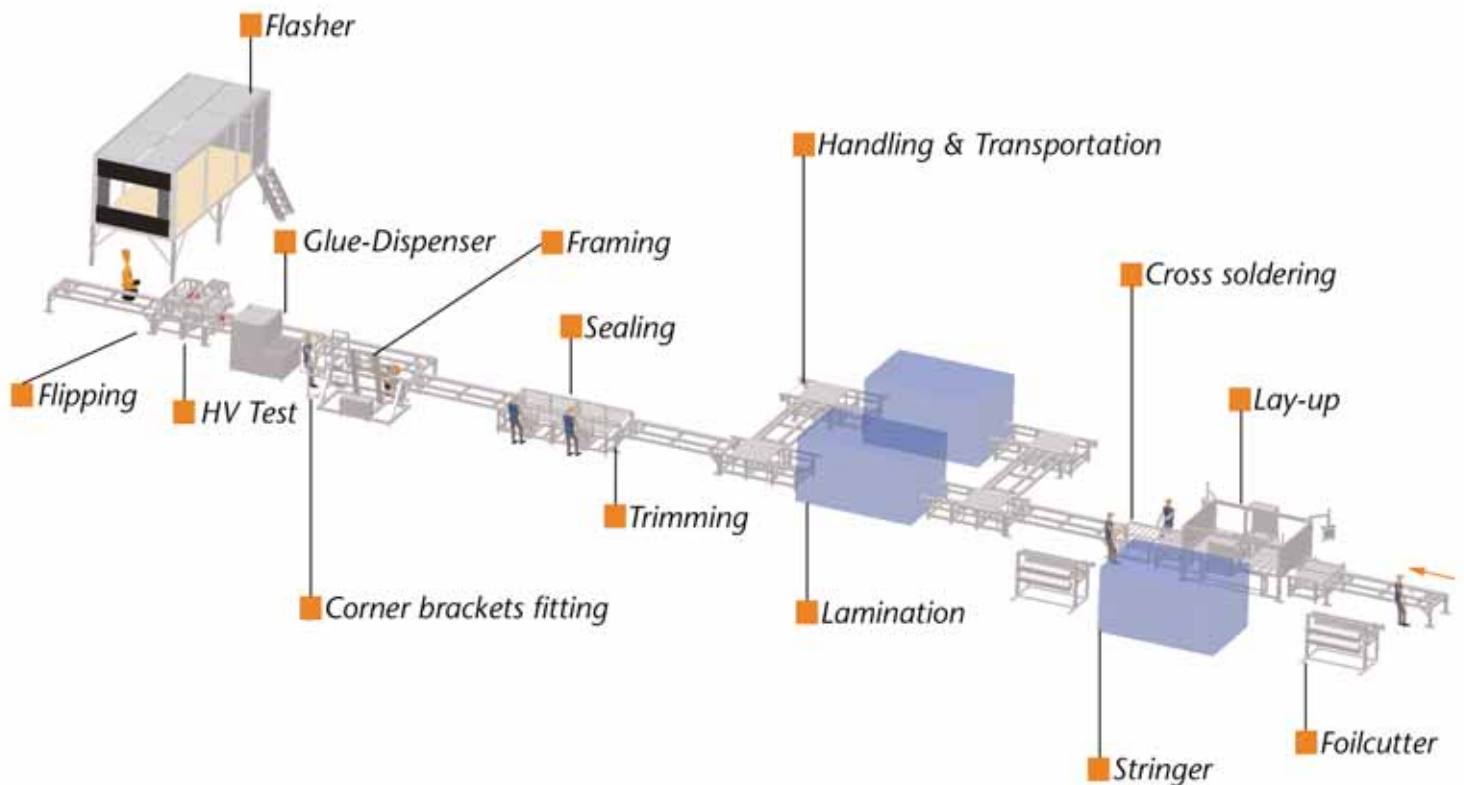
For us innovation means more than just new products. All our processes are constantly optimized. Continuous training of our staff and close cooperation with research and education facilities are the base for a steady innovation process.

# MINITEC SOLARTECHNOLOGY

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## BACKEND LINE



MiniTec's Solar technology is concentrating on systems for the automation of PV module assembly. Several lines are helping to increase productivity at PV producers in Europe and USA. String assembly is one of the most critical processes in the manufacturing of modules. The strings need to be handled gently and with utmost precision. Bad strings should not be allowed to flow into the module assembly-line.

### Specifications and Options

- automatic glass orientation in both directions
- Image-processing to detect cracks, hidden cracks with back lighting, voids, missing soldering links
- data-management with reading or writing of bar codes or numbers
- data-integration
- machine service via telediagnostic system
- flipping station
- glass buffer

- integration with stringer or other machines

### Testing stations

For Solar Simulators (for example BERGER Lichttechnik, H.A.L.M., Endeas, Parsan) MiniTec has built several handling stations around the flasher including automatic module loading, flipping, contacting, HV testing, labelling and sorting into different classes.

### Handling

Some examples of other manufacturing steps where MiniTec is providing handling and assembly-automation:

- module- and glass-handling from incoming inspection up to module-packaging and labelling
- framing
- flipping
- buffering

## AUTOMATIC LAY-UP



### Techn. Data:

- fully automatic operation
- cycle time: < 15 sec/string (with 2 portals, without camera-inspection)
- module sizes: from 500 x 1000 up to 2.000 x 3000 mm
- repeating accuracy: 0.5 mm
- cell-dimensions: min 6", max 8" (others on request)
- power-supply: 400 V, 50 Hz,  
rated output: 6 kVA

### Options:

- automatic glass alignment
- in-process string inspection with cameras
- control of soldering-ribbons
- interface for data-management, bar-code reader, labelprinter
- telediagnostic service
- connection with stringer
- manual soldering table

## SEMI AUTOMATIC LAY-UP



### Techn. Data:

- semi automatic operation

cycle time: < 40 sec/string  
for modules from 500 x 1200 up to  
700 x 1960 mm

repeating accuracy: 0.4 mm

cell-dimensions: min 4", max 6"  
(others on request)

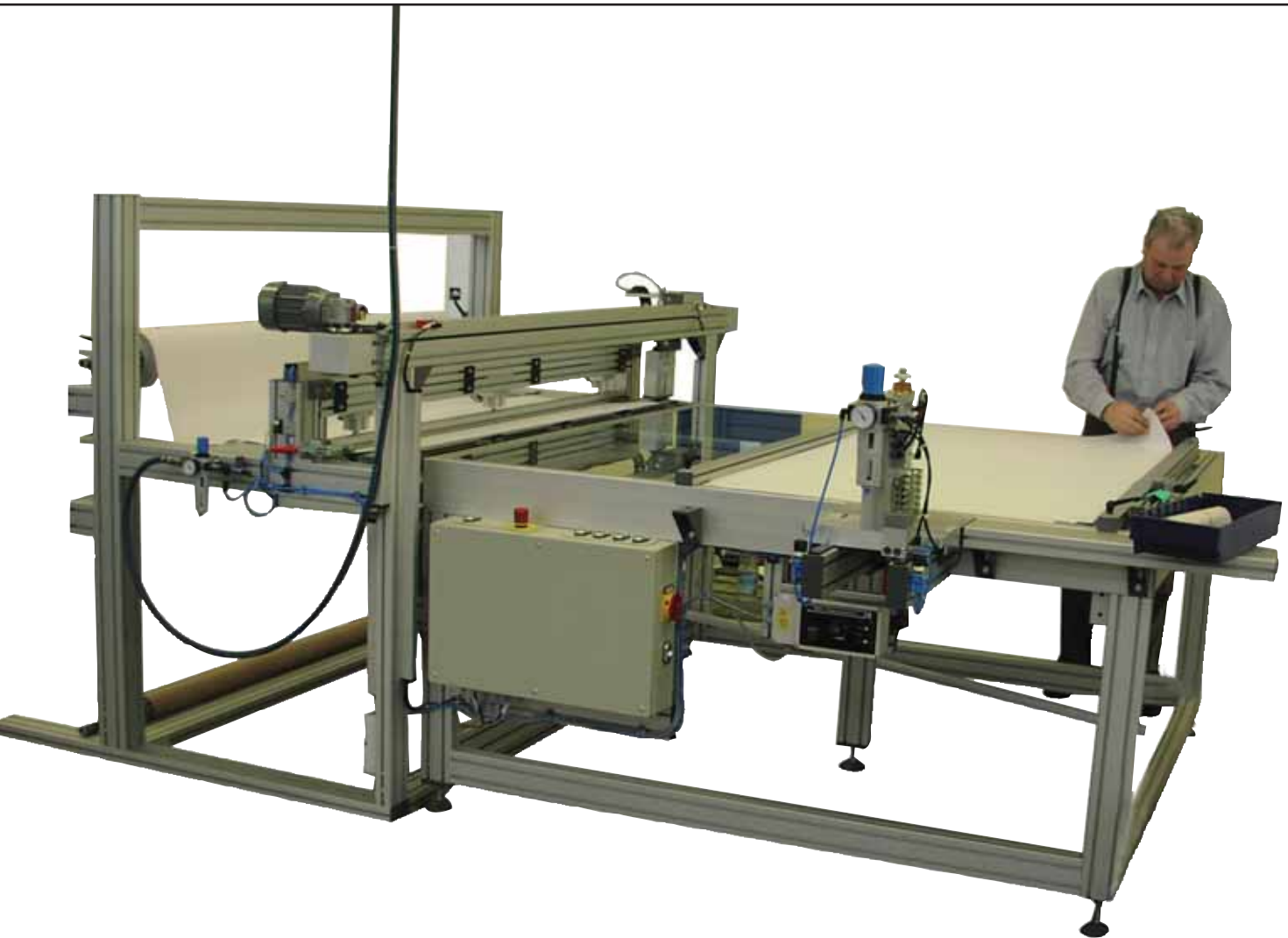
power-supply: 400 V, 50/60 Hz  
(3 phases with zero  
conductor)

rated output: 2 kVA

### Options:

- automatic glass alignment
- interface for data-management, bar-code reader,  
labelprinter
- telediagnostic service
- connection with stringer
- transportation lines for assembled modules

## FOIL-CUTTER



### Techn. Data:

- constituents:
- Electric driven cutter on linear-portal
  - Finish table

### foil sizes:

width min: 200 mm, max: 1700 mm  
length min: 500 mm, max: 1750 mm  
max thickness: 0,5 mm

### recommended foil types:

- Etimex Elvax 0,5 mm
- Icosolar 0,2 mm

### Operation:

- manual unrolling of the foil in desired length
- the machine is equipped with 2 longitudinal-stops
- automatic clamping and cutting

### Options:

- stamping system for junction wires

## GLUE-DISPENSER



### Techn. Data:

- CNC Glue applicator
- Volume controlled glue barrel pump

### Options:

- automatic box loading
- automatic box attachment

### Operation :

- manual loading of connector box
- fully automatic attachment of 2 selfadhesive
- pads on connector box
- automatic spread of coutchouc layer
- following the outline of the connector box

cycle time: depending on box size 45-90 sec



## HORIZONTAL FLASHER



### Techn. Data:

- output metering and classification of assembled modules with connector box

size: depending on flashing system

max module sizes: 2000 x 1500 mm

min module sizes: 1200 x 550 mm

contacting of modules: manual/automatic

### Flasher-System:

Berger Lichttechnik / H.A.L.M. / Endeas / Parsan

- automatic or manual loading of the modules

### Options:

- automatic labelling
- HV test
- set upright station

## VERTICAL FLASHER



### Techn. Data:

- output metering and classification of assembled modules with connector box

size: depending on flashing system

max module sizes: 2000 x 1500 mm

min module sizes: 1200 x 550 mm

contacting of modules: manual/automatic

### Flasher-System:

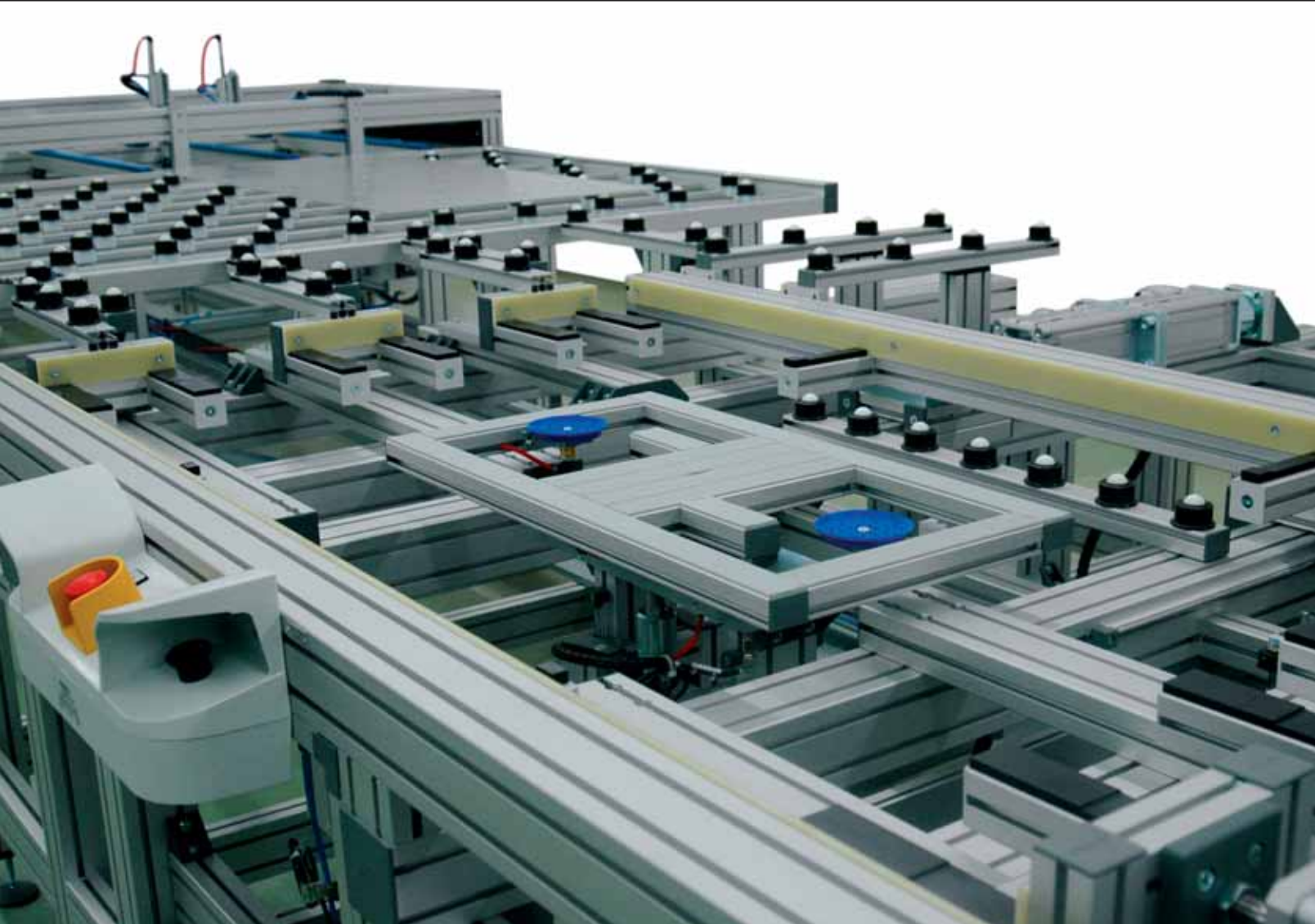
Berger Lichttechnik / H.A.L.M. / Endeas / Parsan

- automatic or manual loading of the modules

### Options:

- automatic labelling
- HV test
- set upright station

## MODULE-FRAMING



### Techn. Data:

- assembling of module frame
- pneumatic or Computer controlled
- manual or automatic

### module sizes:

standard: 1500 x 1000; 800 x 600  
oversize: 2000 x 1600; 1200 x 1000

cycle time: 90s - 180s/ module depending on  
corner joint method and sealing

### Options:

- corner key pre assembly
- screwed frame
- different assembly flows
- two operator handling
- inline or stand alone
- automatic screwing

## TRIMMING STATION



### Techn. Data:

- manual trimming of laminated modules

Max pane dimensions: 2000 x 1500 mm

Min pane dimensions: 1000 x 500 mm

Max weight : 30 kgs

- laminated modules are fixed by vacuum on pneumatic lifted turntable
- manual cutting of supernatant foil

### Options:

- timing belt conveyors with 2, 3 or 4 tracks
- pneumatic pane stoppers
- also useable as cleanstation for assembled modules

## MANUAL FLIPPING



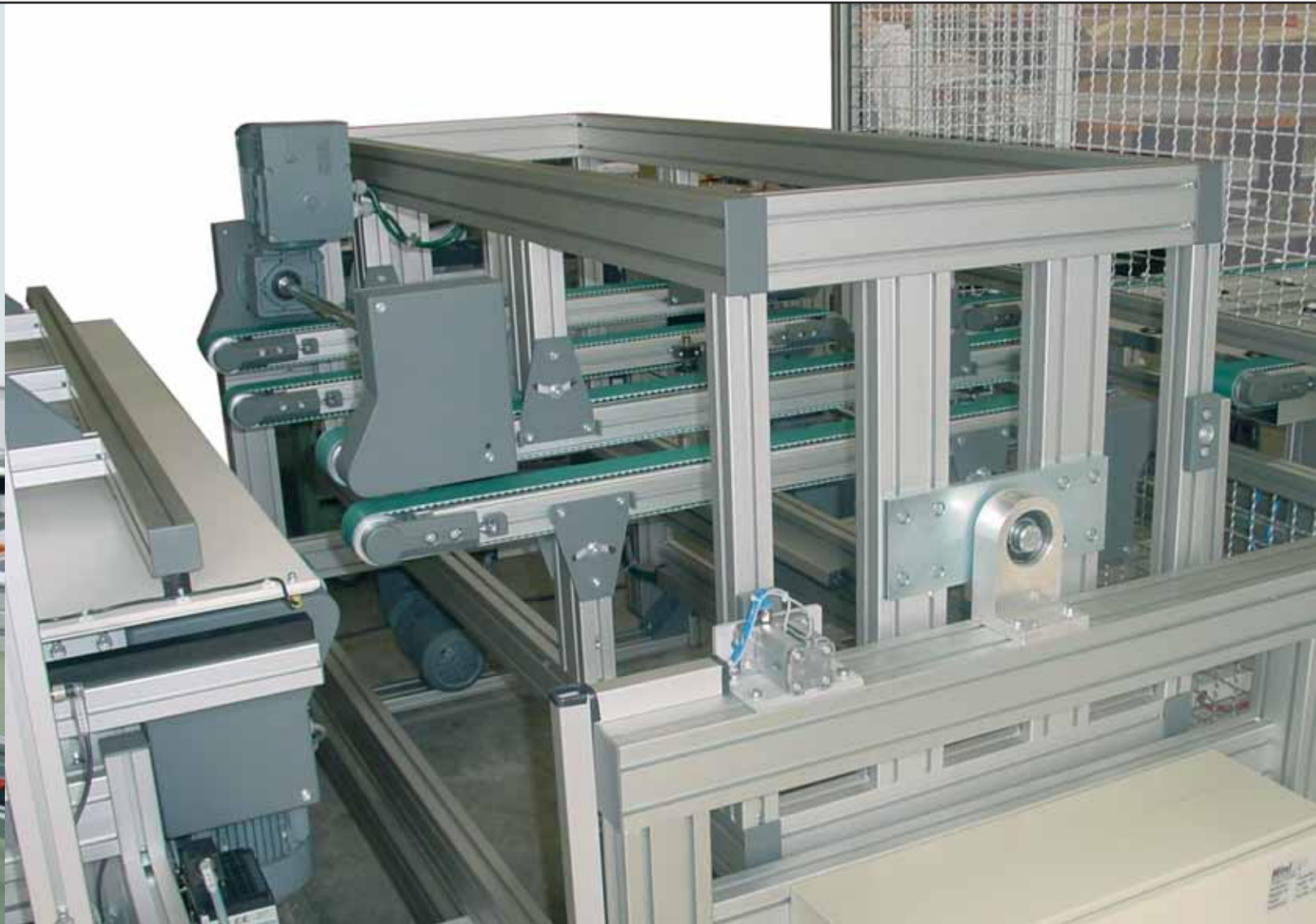
Techn. Data:

- automatic rotating of laminated modules or frame modules with or without connector box

type: timing belt conveyor

max pane dimensions:	2000 x 1500 mm
min pane dimensions:	800 x 500 mm
max weight :	60 kgs

## AUTOMATIC FLIPPING



### Techn. Data:

- manual rotating of laminated modules or frame modules with or without connector box

max pane sizes: 2000 x 1500 mm  
min pane sizes: 1000 x 500 mm  
max pane weight: 30 kg

- The pane is fixed with pneumatic cylinders and vacuum while turning.

### Options:

- automatic operating
- automatic loading and unloading

## GLASS / MODULE BUFFER HD



### Techn. Data:

- Inline buffering of glass panes or laminated modules without frames.

Max total load: 600 kg

Capacity: max 20 panes

Max pane size: 2000 x 1100 mm

Min pane size: 1000 x 600 mm

### Options:

- FIFO-Software
- LIFO-Software
- buffer for framed modules
- automatic loading and unloading

## SOLUTIONS



semi automatic transportation



## SOLUTIONS



manual junction-box attachment on automatic conveyor system

## SOLUTIONS



semi automatic assembly line

## SOLUTIONS

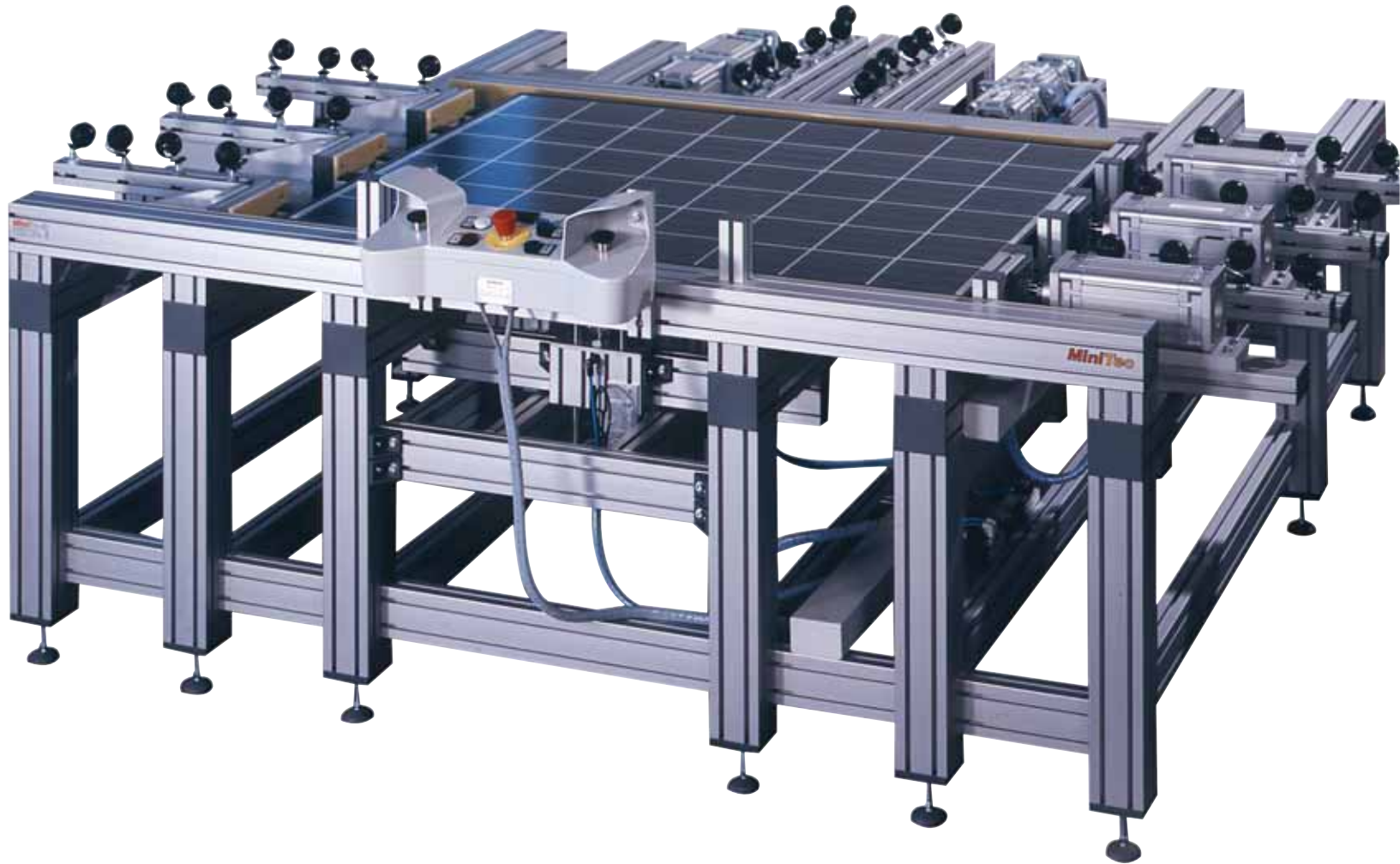


automatic HV-test / isolation-test



roller conveyor with mechanical accumulation protection

## SOLUTIONS



framing station (stand alone)

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