The next generation of high performance P.V. panel manufacturing technology

Key Benefits

- Fully automated P.V. manufacturing lines
- Low cost of ownership
- High performance of up to 190 P.V. panels/hour
- Capacity range from 12 to 160 MW/year
- Multistack laminators with high heating uniformity and low energy consumption
- Small, flexible footprint of laminators
- No silicone membrane multistack laminators
- Modular concept

TEKNISOLAR™ LTD
Teknisolar is a UK based organization dedicated to the development of advanced, fully automated lines for Photovoltaic panels manufacturing with innovative membrane-less multistack lamination technology.
The Teknisolar P.V. manufacturing lines are designed for production of P.V. panels with EVA encapsulant or other encapsulation materials. The P.V. line incorporates the consolidated benefits of Teknisolar Robostak membrane-less multistack Laminator.

The line is fully automated and has been designed in a “modular” mode to adjust the line output to meet customer demand. The glass is automatically loaded on the line; the system will collect the interleaving paper and then dispose of it in a waste basket.

Automatic Stringers are able to handle 450 cells per hour each; the stringers are able to handle square or pseudo-square cells with dimensions of 4”, 5” and 6”. Stringers are positioned onto the panel by mean of an automatic Lay-up system that also inspects the integrity of the strings.

The line has an off-line automatic cutting and piling machine for EVA foils and back sheet foils starting from rolls. Passages for electrical connections are also created.

Manual soldering of bus bars is made on in line assembly tables.
ROBOSTAK LINE

OUR PRODUCTS

The unique Teknisolar solutions enable the lamination of photovoltaic panels to be done at a very high rate and benefit from greatly reduced costs and energy consumption compared to current laminators available on the market.

Our membrane-less laminators are designed to be “modular” which allows simple and easy adjustment of the entire manufacturing line to the capacity, capability, size and thickness of the panels based on the needs of our clients.

The possibility to increase laminating levels, at limited cost, anytime that the market demand requires to also increase the manufacturing output which gives high flexibility to the client manufacturing plan.

The multilevel laminators are divided into two families; the first can go from 3 initial levels up to a maximum of 7 and the second from a minimum of 8 to a maximum of 12. The line capacity will consequently go from about 22 panels per hour equivalents to 40 MW per year (lay out shown as example) to about 90 panels...
## Sample Layout
of a line of 55 panels/hour (100 MW/year)

<table>
<thead>
<tr>
<th>№ Equipment</th>
<th>Equipment description</th>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Glass loader</td>
<td>Automatic glass loader and dry powder removal system</td>
<td>240 glass panels/hour - Rotating brushes and vacuum cleaner</td>
</tr>
<tr>
<td>2 8 Stringers</td>
<td>Automatic Stringer machines</td>
<td>450 cells/hour/each</td>
</tr>
<tr>
<td>3 Scanning camera</td>
<td>Scanning camera to automatically inspect string integrity and dispose the defective ones</td>
<td>330 strings/hour</td>
</tr>
<tr>
<td>4 Lay up system</td>
<td>Automatic strings lay-up system</td>
<td>Max. 330 strings of 10 cells each/hour</td>
</tr>
<tr>
<td>5 Bus-bars cutting machine</td>
<td>Bus-bars cutting and welding system</td>
<td>For 90 panels/hour</td>
</tr>
<tr>
<td>6 EVA and B.S. cutting machine</td>
<td>Automatic cutting of EVA and Back Sheet foils from rolls – Manual positioning of EVA and B.S. on the panel</td>
<td>For 90 panels/hour</td>
</tr>
<tr>
<td>7 Robostak laminator</td>
<td>8 level Robostak membrane less laminator with automatic simultaneous loading and multilevel conveyor with forced air cooling system</td>
<td>64 panels/hour - Max capacity 113MW/year</td>
</tr>
<tr>
<td>8 Trimming machine</td>
<td>Automatic edge trimming machine for EVA and B.S.</td>
<td>8 indepdendent carriages with blades - 55 panels/hour</td>
</tr>
<tr>
<td>9 Frame assembling system</td>
<td>Automatic aluminium frame assembling with in line automatic silicon glue applicator</td>
<td>55 panels/hour</td>
</tr>
<tr>
<td>10 Junction box station</td>
<td>Junction box application manual station</td>
<td>55 panels/hour</td>
</tr>
<tr>
<td>11 Solar simulator</td>
<td>Robotized cell for solar simulation and panel labelling</td>
<td>55 panels/hour</td>
</tr>
<tr>
<td>12 Panel sorting and packing system</td>
<td>Panel sorting and packaging station with robot</td>
<td>55 panels/hour</td>
</tr>
</tbody>
</table>
ROBOSTAK LINE

ADVANTAGES OVER COMPETITORS

All the line equipment responds to the latest technology design.

Teknisolar manufacturing lines are designed with a “modular” concept giving the customer the possibility to increase line output according to the demand with minimum costs and almost zero line down time.

Our multi level laminators without the silicon membrane have far better up-time and yields compared to multi level competitor’s laminators with the silicon membrane. Moreover a membrane-less multilevel laminator will be unique for glass-glass panels. The downside of the competitors’ silicon membrane laminators is applying a “pinch” effect to the edges of the panels squeezing out the EVA, bending the upper glass and potentially breaking it at the periphery.

The absence of silicon membrane is of great benefit especially for multistack laminators for which the frequency of membrane replacement is very high.

The laminator is completely automated; it is loaded and unloaded by multilevel conveyors.

The footprint required for installation is very small. The energy consumption is lower than other multilevel laminators presently available on the market.
WHY CHOOSE TEKNISOLAR

Teknisolar P.V. panel’s complete manufacturing line is based on innovative equipment design and our Robostak membrane-less multistack laminators provide high capacity, low cost of ownership and low power consumption.

Teknisolar lines are designed to be easily adjusted to customer’s capacity needs.

We have a highly experienced team with multi-decade experience in glass manufacturing and lamination technology.

Strategic partnership with key players in the solar industry that enables Teknisolar to manufacture our entire lines on schedule and at reduced costs, ensuring that our lines are thoroughly tested and that our laminators, stringers, lay up systems etc fully meet and exceed our client’s expectations.

Teknisolar has the complete production know-how and can provide the client’s staff theoretical and hands-on training programs and in implementing the best Quality Management Plan.

Automatic on line Quality Control systems are able to sort out defective products guarantying 100% product conformity.

Efficient after sale assistance is guaranteed.

**Strength points**

- Consolidated experience on glass manufacturing and lamination process.
- Design engineers and a fully equipped mechanical plant enabled Teknisolar to build a R&D laminator, this will allow implementing and testing continuous improvements.
- The R&D laminator allows the testing of conventional and/or new materials at customer presence
- Complete high technology, fully integrated PV manufacturing lines designed with modular concept to adjust line’s output to customer’s demand
- No silicon membrane replacement
- Prompt after sale service assistance
- Competitive price
Headquarters
Teknisolar Limited
Sci-Tech Daresbury
Keckwick Lane
Daresbury,
Cheshire WA4 4FS
England

Registered Office
Teknisolar Limited
2nd Flr Hanover House
30 Charlotte Street
Manchester M1 4EX
England
T: +44 (0)1925 607192
F: +44 (0)1925 607398
M: +39 335 235134
E: info@teknisolar.com

Website: www.teknisolar.com
Company Reg No: 05119325
VAT Reg No: GB846 3819 95

Italian Office
Viale Marisa Bellisario, 46
Zona industriale
66050
San Salvo (CH)
Italy