

PV PRODUCTION LINES FROM MINITEC

EVERYTHING FROM A SINGLE SOURCE

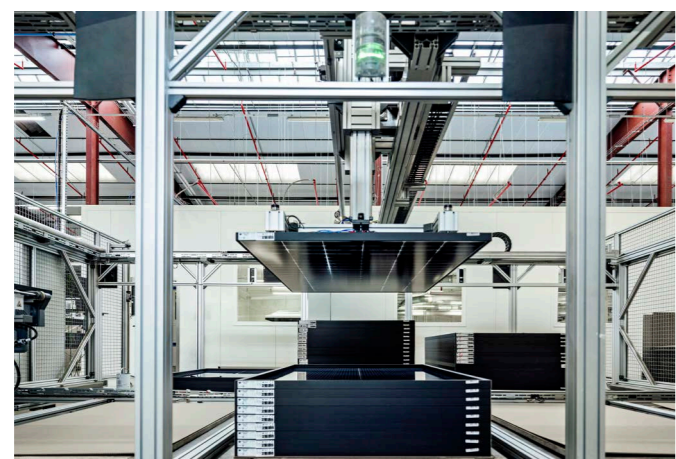
Photovoltaics is currently experiencing a major renaissance. Climate change, the energy transition and decarbonization are leading to a sharp increase in demand for PV modules worldwide - and thus also to a significant expansion of production capacities in the solar industry.

Benefit from this development and implement your photovoltaic production line with MiniTec now. We have many years of industry expertise and offer you a modular solution concept ranging from individual sub-components to complete production lines.

The flexible MiniTec modular profile system ensures that the system can be adapted to your individual requirements. From the layout of the system to design, on-site assembly, commissioning and staff training, we offer you everything from a single source.



Automatic conveyor line



3-axis stacking port

MiniTec
THE ART OF SIMPLICITY

LOCATIONS WORLDWIDE

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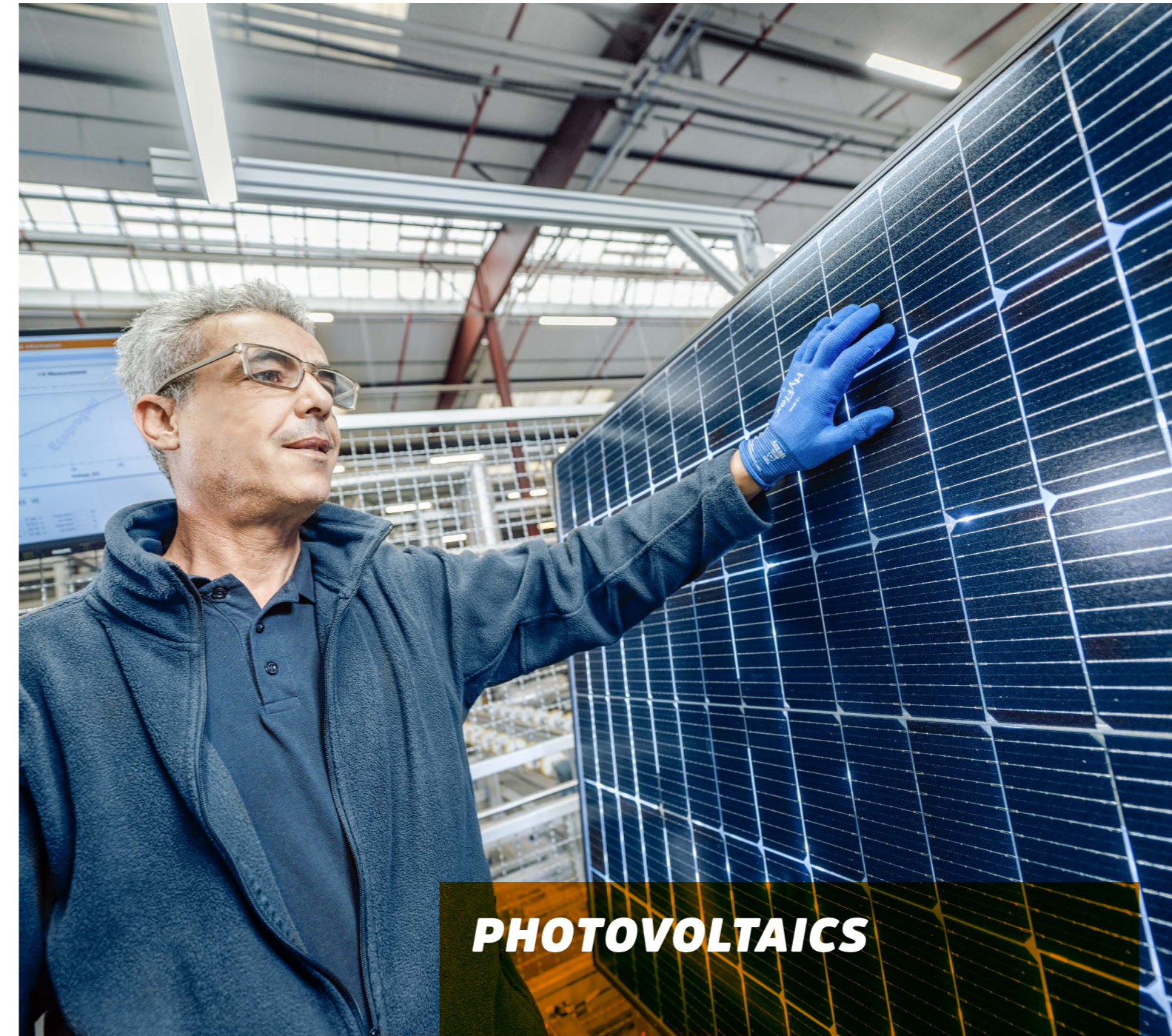


MiniTec partners worldwide

Australia | Austria | Belgium | Bosnia and Herzegovina | Brazil | Bulgaria | Canada | China | Croatia
Czech Republic | Estonia | Finland | France | Greece | Hungary | India | Italy | Latvia | Liechtenstein
Lithuania | Luxembourg | Malaysia | Mexico | Montenegro | Netherlands | New Zealand | Northmacedonia
Poland | Portugal | Romania | Russia | Serbia | Singapore | Slovakia | Slovenia | South Africa | Spain
Sweden | Switzerland | Turkey | Ukraine | United Kingdom | USA | Vietnam

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MiniTec
THE ART OF SIMPLICITY



PHOTOVOLTAICS

Production lines for
module manufacturing



MiniTec Facts & figures

1986
Founded

420
Employees
280 in Germany

60
Sales and
service partners
around the world

Business award
„Innovativer Mittelstand“
Award
„Attraktiver Arbeitgeber
Rheinland-Pfalz“
Honorary award
of the region Westpfalz
Hidden Champion

11
Locations
Germany, France, Slovenia,
United Kingdom, Spain,
USA, China

since 1996
PV equipment

THE ART OF SIMPLICITY

MiniTec has continuously developed from a specialist for miniature guides into a leading technology company and special machine manufacturer.

Today, 420 experts at 11 locations in Germany, France, USA, Great Britain, Spain, Slovenia and China develop tailor-made solutions for our customers. At the same time more than 60 partners worldwide provide reliable service and expert advice.

As a full-service manufacturer, we use our design system to realize intelligent solutions and special machines for a wide range of tasks in all major industrial sectors. We have been operating successfully in the field of PV production lines since 1996. In addition, we also build systems for battery production and solar thermal energy in the field of renewable energies. In line with our high technical standards, the motto for our complete solutions is: The Art of Simplicity.



ALL PROCESSES UNDER CONTROL

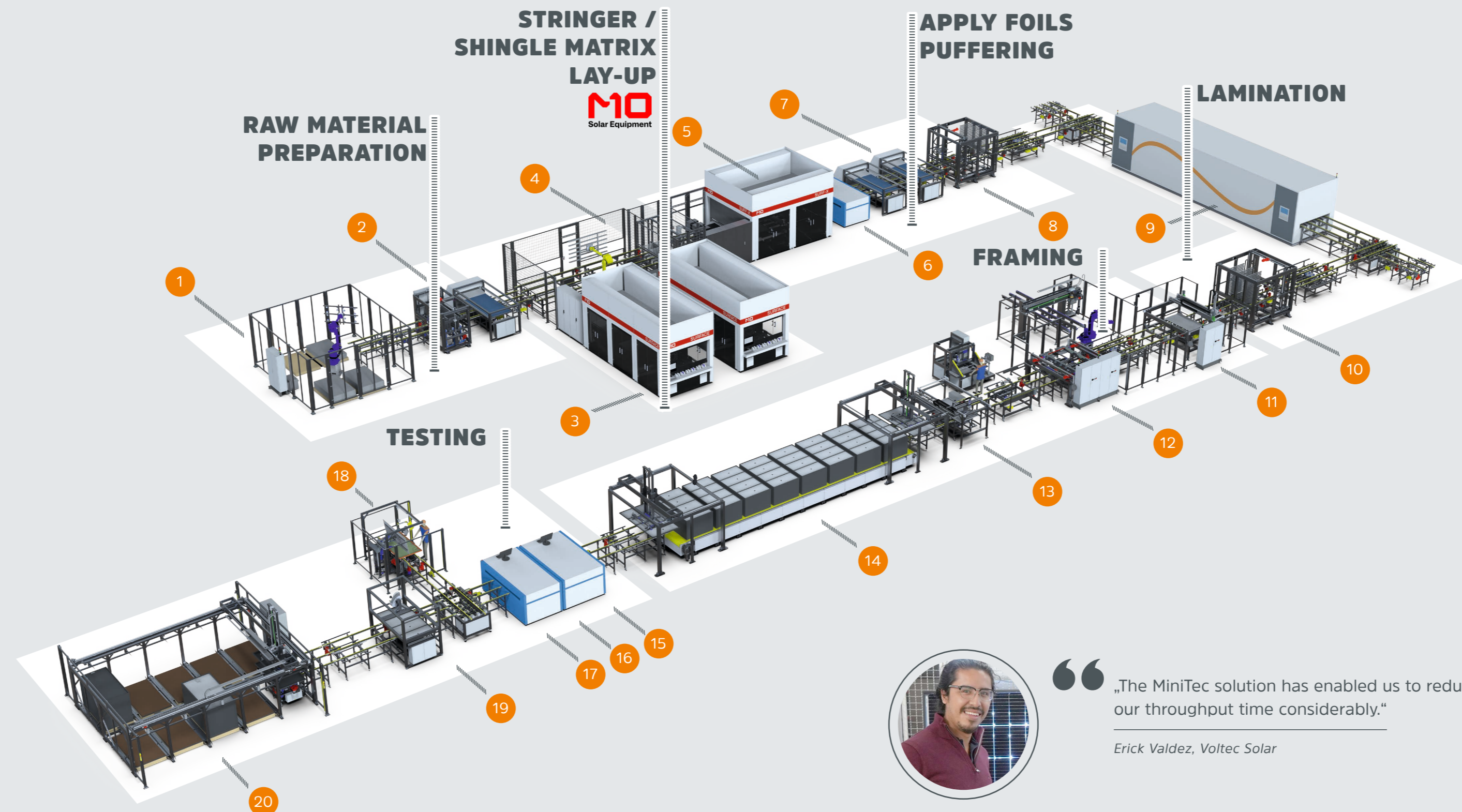
A COMPLETE SOLUTION WITH MINITEC

Photovoltaic modules are manufactured in typical sub-steps. In principle, such a system consists of workstations, buffers and conveyor lines in between. There is also special equipment. MiniTec turns all this into an efficient overall solution for you. If we do not have our own product for individual areas, for example for stringers, lay-up or laminators, we integrate proven components from high-performance partners.



PRODUCTION PROCESS

FROM THE GLASS STORAGE TO THE FINISHED MODULE



„The MiniTec solution has enabled us to reduce our throughput time considerably.“

Erick Valdez, Voltec Solar

- 1 Automatic glass loading**
The glass is loaded in the glass store and optionally cleaned in a glass washing system.
- 2 Cutting and automatic depositing of embedding material**
- 3 Shingling machine (M10) or stringer**
In shingling, the cells are arranged overlapping in a matrix. This results in a larger active area on the same module surface. Alternative method: Stringer. The cells are connected to strings using busbars (conductor strips) by gluing or soldering.
- 4 Automatic lay-up**
Laying the strings or the shingle matrix on the front glass covered with embedding material.
- 5 Cross-connection**
The strings or matrices are electrically connected. The conductor strips, which are later contacted in the junction boxes, are attached.
- 6 EL tester**
A voltage is applied. The cells light up in the infrared range. Special cameras detect cell breakages and other defects.
- 7 Cutting, automatic depositing of embedding material and backsheet**
- 8 FIFO storage**
Intermediate storage according to the first-in-first-out principle.
- 9 Laminator**
The modules are „baked“ in a vacuum. The embedding materials cross-link at appropriate temperatures. Air and gases are drawn out of the module in a vacuum.
- 10 FIFO or LIFO storage**
Intermediate storage according to the first-in-first-out or last-in-first-out principle.
- 11 Automatic framing**
Processing of the laminate edges. The module is picked up by a toothed belt conveyor, aligned and fixed by vacuum suction cups. The edges are then trimmed with knives.
- 12 Automatic framing**
Optional: automatic siliconizing.
- 13 Semi-automatic (connection) box assembly**
Optional: including potting.
- 14 Curing line**
- 15 EL tester**
- 16 Flasher (sun simulator)**
Generates a flash in a specific light spectrum. Records the power curve of the module. Determination of the power class. Detection of faults in the wiring or cell failures.
- 17 High voltage test**
A high voltage is applied and maintained. The insulation resistance is measured. After the evaluation, the IO/NIO decision for the tested part can be made based on the test result.
- 18 Visual inspection**
The panel is lifted with a pneumatic multi-joint arm and placed in a vertical position. An employee inspects the panel and assigns it to the appropriate quality level.
- 19 Labeling machine**
- 20 Sorting system finished modules**