

Front contact grid
Metal back contact
SiN anti-reflective layer
Low resistivity emitter
High resistivity emitter
Silicon basis
Al-BSF

- Guaranteed throughput, module power, yield and completion date
- Optimization of the entire cost structure
- Optimized interface between cell and module fabrication
- Optimized device designs for cell and module
- Comprehensive support, customer training, module design and certification
- Future-proof technologies and sustainable fabrication concepts
- R&D activities along the entire value chain

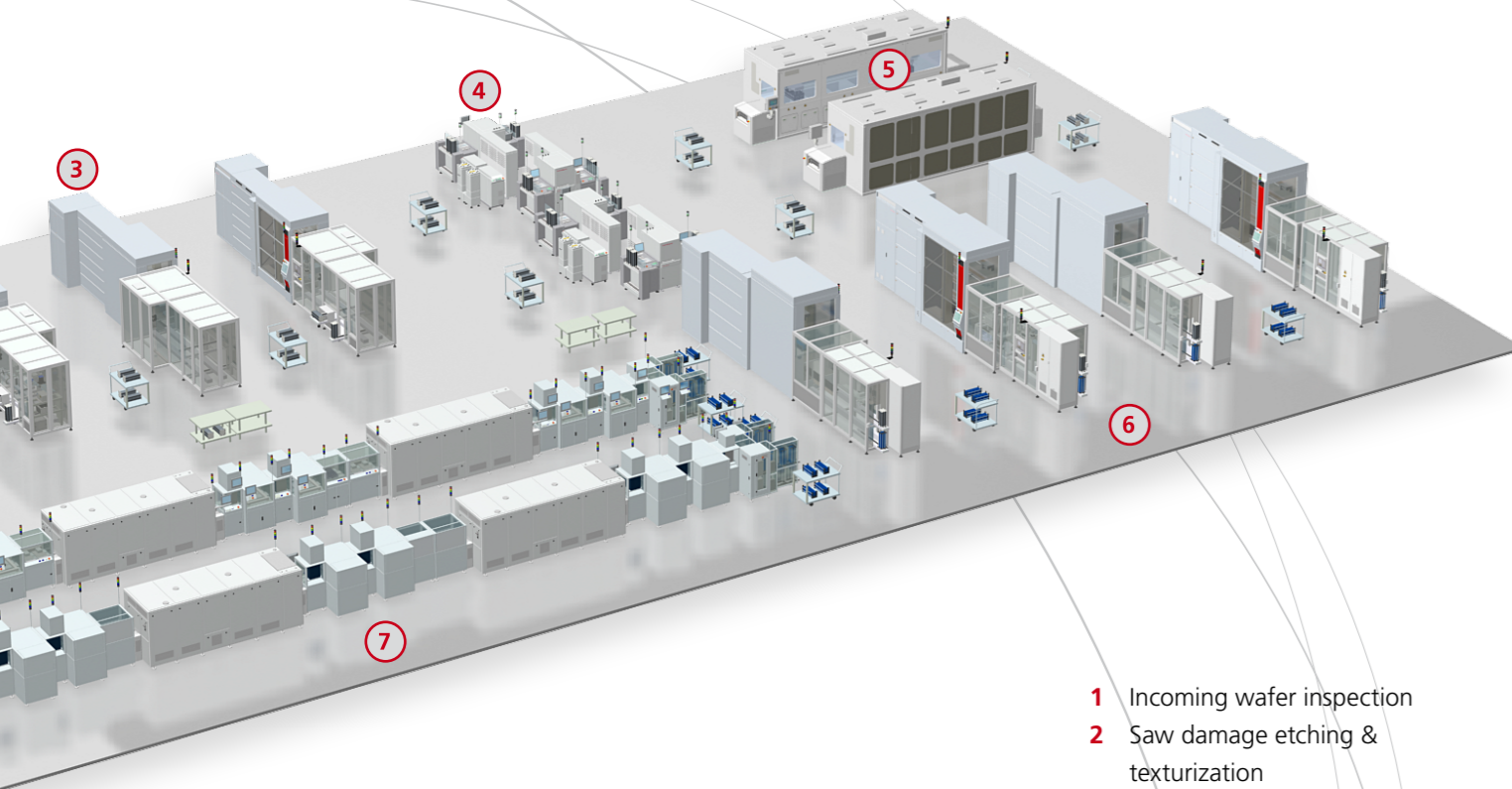
centrotherm
photovoltaics

Turnkey solutions for
integrated solar
module manufacturing

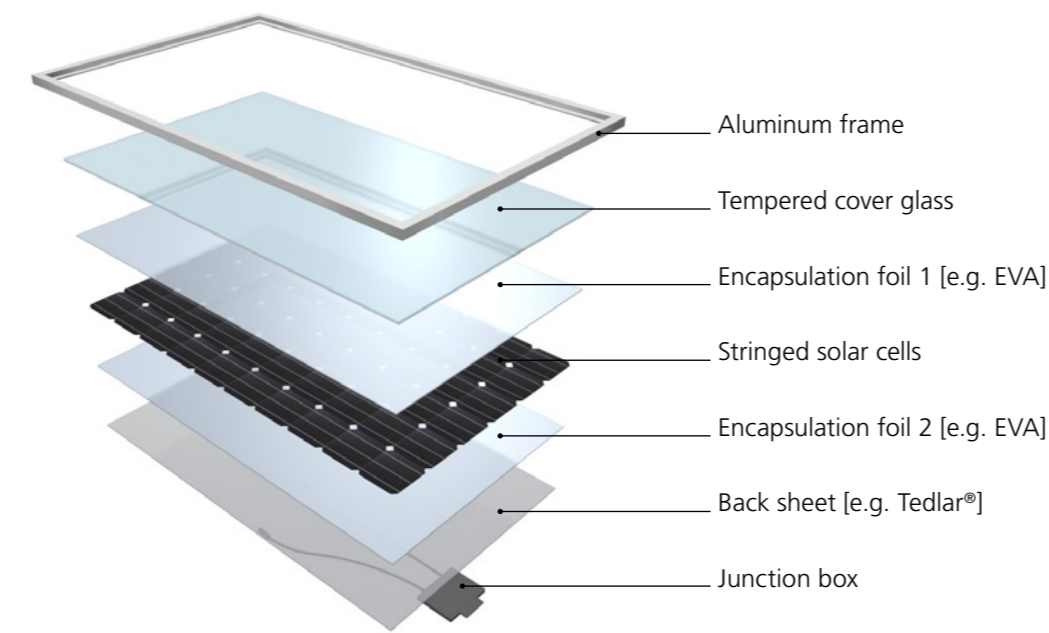


centrotherm
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Silicon & Wafer
Solar Cell & Module
Thin Film Module



- 1 Incoming wafer inspection
- 2 Saw damage etching & texturization
- 3 POCl_3 diffusion
- 4 Laser diffusion
- 5 PSG removal
- 6 AR coating & passivation
- 7 Metallization
- 8 Fast firing
- 9 Edge isolation
- 10 Testing & sorting



Aluminum frame
Tempered cover glass
Encapsulation foil 1 [e.g. EVA]
Stringed solar cells
Encapsulation foil 2 [e.g. EVA]
Back sheet [e.g. Tedlar®]
Junction box

centrotherm photovoltaics AG reserves the right to make changes in the product specifications at any time and without notice | Z | P | Module | 02 | E | 11 | 01 |

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Innovative cell design

The successful implementation of the **selective emitter technology** led to a further improvement of our proprietary cell design: by means of a variation in phosphorus doping on the cell surface we can optimize contact and recombination losses independently which leads to higher cell efficiency.

Turnkey solutions for integrated solar module manufacturing

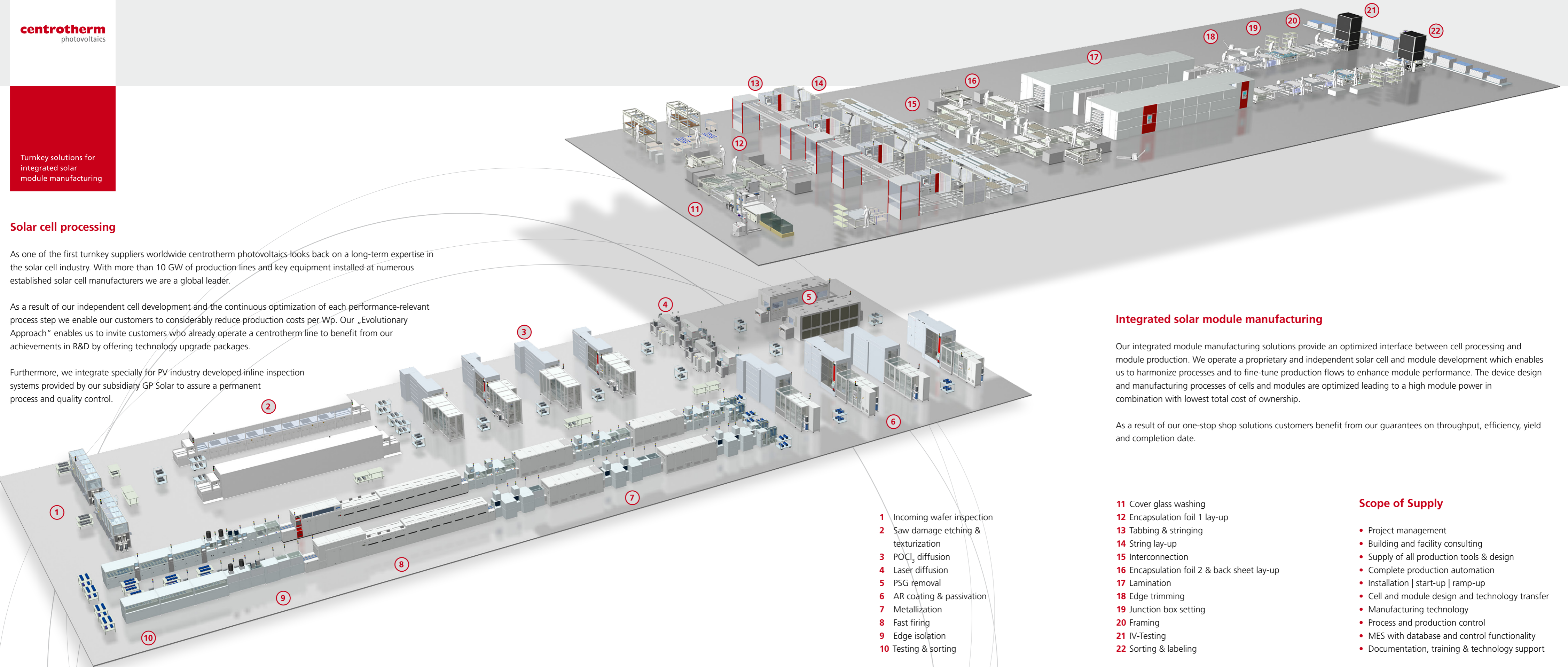


Solar cell processing

As one of the first turnkey suppliers worldwide centrotherm photovoltaics looks back on a long-term expertise in the solar cell industry. With more than 10 GW of production lines and key equipment installed at numerous established solar cell manufacturers we are a global leader.

As a result of our independent cell development and the continuous optimization of each performance-relevant process step we enable our customers to considerably reduce production costs per Wp. Our „Evolutionary Approach“ enables us to invite customers who already operate a centrotherm line to benefit from our achievements in R&D by offering technology upgrade packages.

Furthermore, we integrate specially for PV industry developed inline inspection systems provided by our subsidiary GP Solar to assure a permanent process and quality control.



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Integrated solar module manufacturing

Our integrated module manufacturing solutions provide an optimized interface between cell processing and module production. We operate a proprietary and independent solar cell and module development which enables us to harmonize processes and to fine-tune production flows to enhance module performance. The device design and manufacturing processes of cells and modules are optimized leading to a high module power in combination with lowest total cost of ownership.

As a result of our one-stop shop solutions customers benefit from our guarantees on throughput, efficiency, yield and completion date.

- 11 Cover glass washing
- 12 Encapsulation foil 1 lay-up
- 13 Tabbing & stringing
- 14 String lay-up
- 15 Interconnection
- 16 Encapsulation foil 2 & back sheet lay-up
- 17 Lamination
- 18 Edge trimming
- 19 Junction box setting
- 20 Framing
- 21 IV-Testing
- 22 Sorting & labeling

Scope of Supply

- Project management
- Building and facility consulting
- Supply of all production tools & design
- Complete production automation
- Installation | start-up | ramp-up
- Cell and module design and technology transfer
- Manufacturing technology
- Process and production control
- MES with database and control functionality
- Documentation, training & technology support