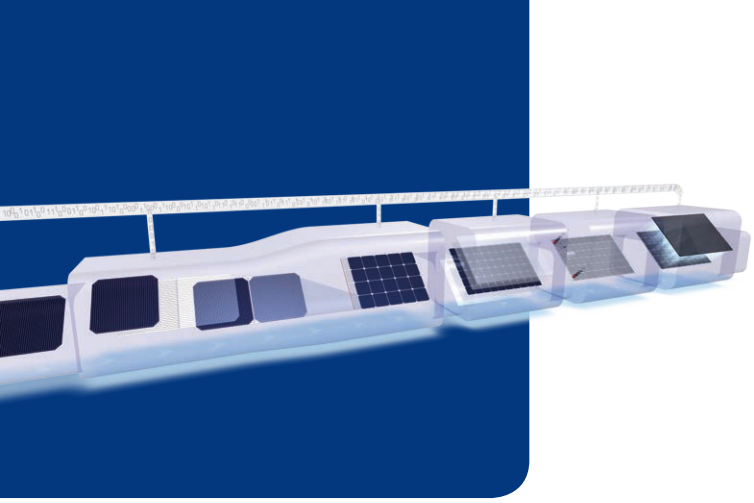


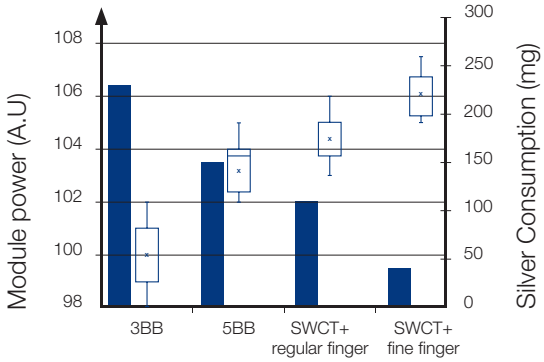
MEYER BURGER

Module Production SmartWire

Towards higher module power output

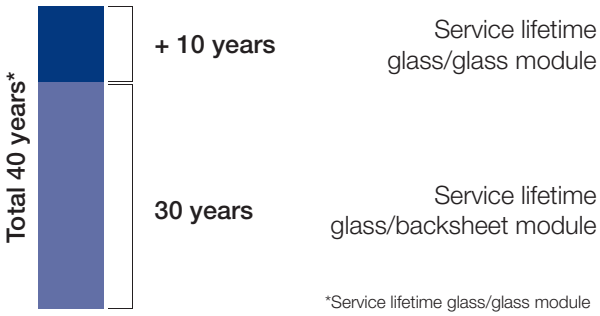
SmartWire: The fine art of cell connection

- **Higher module power output:**
  compared to conventional 3-busbar technology
  Ohmic loss reduction and improved shading
  on the solar cell with thin wires and
  dense contact matrix
- **Significant reduction of silver consumption in cell production:**
  Thinner fingers
  Designed for busbarless cells



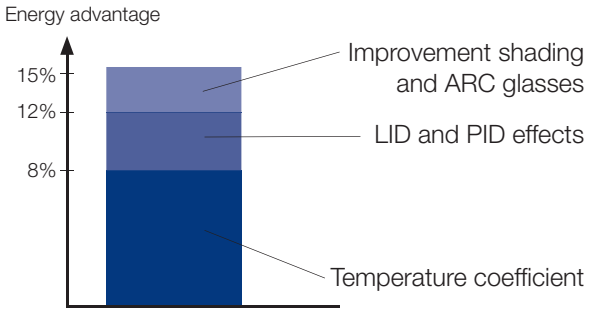
New age of module production

- **Cost optimized module design**
  Without lower cross connectors and using decentralized junction boxes a compact, frameless module design is achieved
- **Longer service life of glass/glass modules**
  Glass aging is negligible. This extends the service life of a glass/glass module by least 10 years.
- **ARC glasses for higher energy yield**



High-performance combination*

- **Outstanding temperature coefficient**
  At a NOCT (normal operating cell temperature) of 60°C, the increase in efficiency is 8%.
- **No LID and PID effects**
- **Lower BOS costs:**
  Thanks to the significantly higher module efficiency of more than 20% with HJT SWCT modules a typical BOS cost advantage of 11% can be achieved.

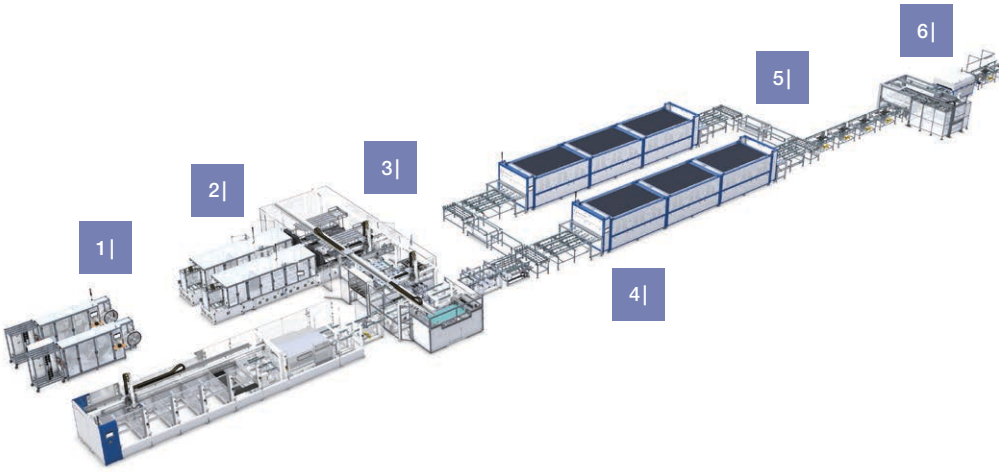


*In combination with HJT cells

SWCT Module Production Line and Process Steps

Integrated Production Line

Meyer Burger provides cost-efficient plug-and-play module production lines to enable SWCT in mass production within short timeframes. This allows direct know-how transfer and results in best in class ramp-up and shortest return-on-investment.



1|

Foils and Wires
The foils and the wires are connected alternately (the wires pass over the top on the first piece and underneath the foil on the next) to form the coil with the foil-wire electrode.

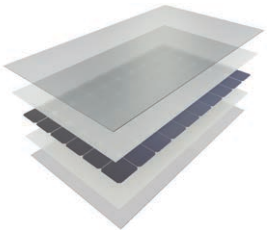
2|

Cell Connection
The solar cells are linked by means of the foil-wire electrode to form a string. The electrical interconnection of the strings only takes place during the laminating process.

3|

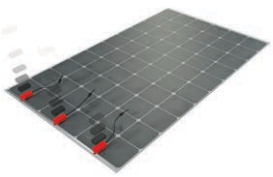
Layup and Matrix
The strings are positioned on the glass and encapsulant to form the solar-cell matrix.

4|



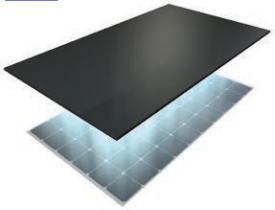
Encapsulation
In order to protect the cells from environmental influences, the individual layers are bonded together under vacuum, using pressure and heat, to form the final solar module.

5|



Final Assembly
In the final assembly, sockets are attached to the module.

6|



Testing
The final step is to test each module for performance, Hi-Pot and EL.

Core Competency in Module Production

SmartWire Connection Technology

In comparison to 3-busbar technology, Meyer Burger's SmartWire Connection technology delivers an increased performance yield of 3% for solar cells following encapsulation in the module. This is made possible by the dense contact matrix on the solar cell. The effective wire shading averages only 70% of the wire diameter through internal reflections in the SWCT design.

In contrast to standard busbar technology where each finger routes the electrical currents to a busbar, the SWCT connects all fingers together directly on the surface of the cell. The fingers are electrically connected in a close grid which even prevents the negative impact of micro cracks and cell breaks on the cell.

Electroluminescence therefore shows a fully functioning solar cell. The result is an increased yield of around 1%. SWCT is compatible to all silicon cell technologies and can also be used in the next generation of finger metalli- sation technology.

Glass /Glass module

Compared to standard glass/backsheet modules, the trendsetting glass/glass modules are constructed without the aluminium frame and are equipped with thinner front glass.

This reduces the cost of production. The thinner front glass with anti-reflecting coating has a positive impact on module efficiency and maintains consistent stability compared to framed modules.

Glass/glass modules offer the best protection against environmental influences and have a life span of over 40 years.

Module Inspection System

Meyer Burger sets the recognised standard for industrial measurement technology with its new Module Inspection System - MIS. It relies entirely on the LED technology. The MIS is certified by TÜV for its $A^+A^+A^+$ measurement results and validated by the National Institute of Metrology China (NIM).

The Pasan DragonBack® dynamic sweep methodology dedicated to the measurement of high efficiency modules combined with our unequalled testers' quality allows high accurate measurements under production conditions.

Known for its compact design:
The Module Inspection System MIS

Module production with Meyer Burger

Process know-how

Module manufacturers developing new products for which the process parameters need to be compiled reap the benefit of Meyer Burger manufacturing know-how. Meyer Burger assistance enables them to position themselves better on the market. Among other things, Meyer Burger shows their customers:

- How to master all production-relevant process steps, from glass cleaning and cell connection up to performance measurement
- Cost and performance-optimised module designs
- Training concepts for the production workforce
- Maintenance and production planning
- Establishment of a quality management system

Analyses of their existing production with a view to a sustained improvement in yield and quality.

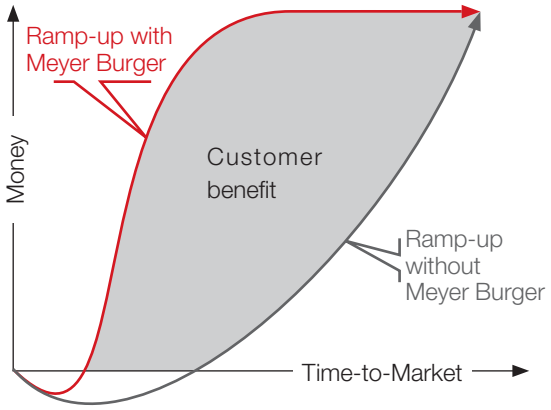
Production ramp-up

Meyer Burger support customers to speed up their entrance to market. During the ramp-up phase improvements targeting production cost reduction and higher production quality result in a significant customer benefit.

Certification

Because Meyer Burger has standardised the most important sub-processes of a module production line thanks to its many years of collaboration with the TÜV und SGS testing institutes, customers are able to obtain their own module certificate shortly after their module production has begun.

At Meyer Burger, the necessary clarifications and preparations for batch certifications commence in parallel with the production of the ordered equipment, enabling potential risks to be identified at an early stage and solutions to be introduced.



SGS TÜV SAAR
IEC 61215
IEC 61730
Periodical Inspection

Technical data at a glance

Module type		Glass/Backsheet Glass/Glass, BIPV
Module sizes	[mm]	1'600 - 1'700 [L] 950 - 1'010 [W] 60 cell modules
Cell types		Mono- and polycrystalline
Cell dimension		cells without busbars
Cell thickness	[µm]	160 - 180, thinner on request

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