

MWT cell- and module technology

Enhanced performance

Metal wrap-through (MWT) back contact cell- and module technology is a proven platform for lower cost of ownership and higher power output for wafer-based silicon solar modules.

What can ECN do for you?

- Provide demonstration of MWT cell- and module technology.
- Transfer of MWT cell- and module technology processes in collaboration with industrial partners for supply of apparatus and materials.
- Assist in setting up production lines or adapting existing production lines to achieve specifications for power output and throughput.
- Recommend materials suppliers for the manufacture of high-performance, reliable modules.
- Support your development and implementation of new materials and processes suitable for MWT cell- and module manufacture such as metallisation pastes, interconnection solutions, conductive back-sheets and encapsulants.

Higher cell- and module power output by 6%

The manufacturing process for MWT cells uses the same materials as the process for standard H-pattern cells. The only additional process step is to drill 16 vias in the wafer using a laser. The optimised metallisation pattern on the front of the cell leads to reduced shadowing whilst retaining excellent current-carrying properties. Silver consumption is reduced by 25%, whilst the short-circuit current is increased by 2%. In the module, the absence of tabs at the front of the cells also means that this increased current is retained. Module fill factors above 78% have been obtained, 4% higher than for standard modules. In total, 6% higher output is obtained. The cells can also be placed closer together in the module as there are no tabs passing between the cells. This increases the effective module area.

Integrated cell- and module design

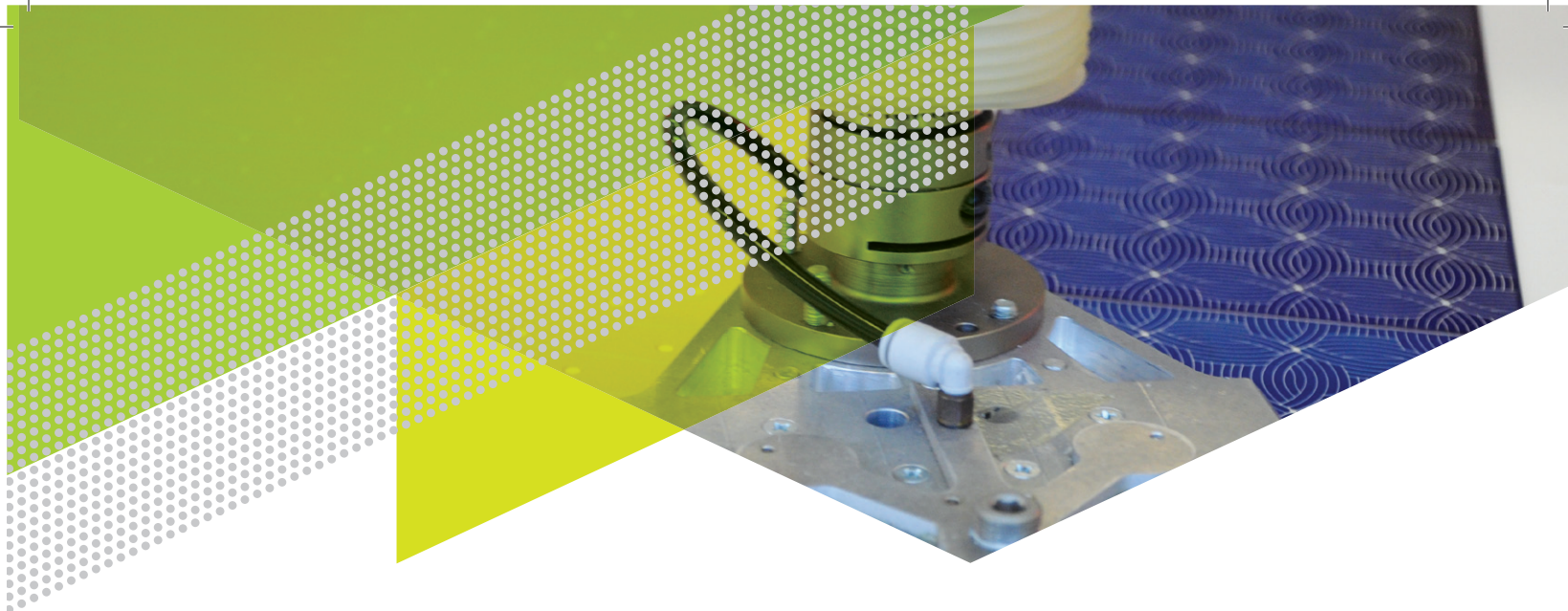
The conductive back-sheet foil is designed to efficiently transport the current. The full area behind the cells is used for conduction, thus reducing the resistive losses in the module. Bussing used to connect the strings in a standard H-pattern module is no longer needed as this is included in the foil design. This results in smaller overall module dimensions for an increased power output. The conductive foil allows integration of smart electronics. The module manufacturer is not restricted by the module layout to a specific number of by-pass diodes as with H-pattern modules. The foil can be coated between the cells for aesthetic- or performance improvement. A dark coating gives a very uniform finish to the module, whereas a white coating will give an enhanced power output.

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Easy module manufacture suitable for very thin cells

Module manufacture is performed by pick-and-place of the cells. Each cell is manipulated only once during the whole process. This reduces yield loss to virtually zero and makes the process suitable for cells with thicknesses below 100 μm . In addition, the interconnection between the cells and the conductive back-sheet is made using a conductive adhesive. The adhesive is chosen to cure under the same conditions as the encapsulant, thus allowing a combined interconnection and lamination process to be performed in a standard laminator. There is no local heating of the cells as seen with the soldering of tabs, therefore reducing the chance of damage to the cells. The module manufacturing process is up to eight times faster than a comparable H-pattern process, with a throughput of one module per minute. This high throughput is combined with a small footprint for the module manufacturing line and is achieved with a reduced number of operators.

Module concept compatible with other back-contact cell types

The MWT module concept is suitable for other types of back-contact cells. The contact pattern on the foil can be adjusted to accommodate EWT- or IBC cells. The use of a foil-based module with this type of cells will result in much lower cell-to-module losses than can be achieved with contacts at the edges of the cells.

