

Interconnection evolution

After a difficult couple of years, things are finally looking brighter for European PV equipment suppliers in 2022, with new projects on the horizon and plenty of space for innovation in the market. Germany's M10 Solar Equipment is introducing a brand new, flexible approach to cell interconnection that promises big energy yield gains compared to typical half-cut cell multi-busbar modules. And the company is already seeing plenty of interest from producers developing products ranging from conventional modules to building-integrated PV and beyond, as M10 Solar Equipment CEO Philipp Zahn and Business Development Manager Michael Kröffges recently told *pV magazine*.

At its headquarters in Freiburg, Germany, M10 Solar Equipment has a demonstration line for its "Surface" tool up and running, where customers can test and adapt the processes to their particular manufacturing plans.

Manufacturing is very much back on the agenda for Europe's solar industry in 2022, with renewed focus on both decarbonization and energy independence leading a drive for local manufacturing of PV products from start to finish. And with this market confidence comes additional space for product differentiation and new innovations pushing higher performance, especially important in a region like Europe that may not always have the lowest manufacturing cost.

The M10 Industries team in Germany had decades of experience in supplying stringer machines for solar cell interconnection before exiting the segment in 2018, amid fierce competition from lower cost equipment suppliers in Asia. Despite this move, the company says it never doubted that conditions in the solar industry would improve. Behind the scenes it continued to innovate, working with leading German research institute Fraunhofer ISE on an entirely new concept for cell interconnection, one that would overcome many challenges inherent to most conventional approaches.

"We had worked with Fraunhofer ISE on a few smaller things over the years and had built up a lot of trust between the two of us," M10 Solar Equipment CEO Philipp Zahn told *pV magazine*. "It seemed crazy at the time, sitting down to talk about solar projects in November 2019 when the industry was at its lowest point. But that's what we did, the vision never faded."

Then, in late 2021 M10 first introduced its new "shingled cell matrix" approach to the public, and today is operating a demonstration line at its headquarters in Freiburg, and as M10 Solar Equipment GmbH – a joint venture between M10 and automation equipment experts Zahoransky, is ready to take orders and work with customers taking all sorts of approaches to producing new solar products.

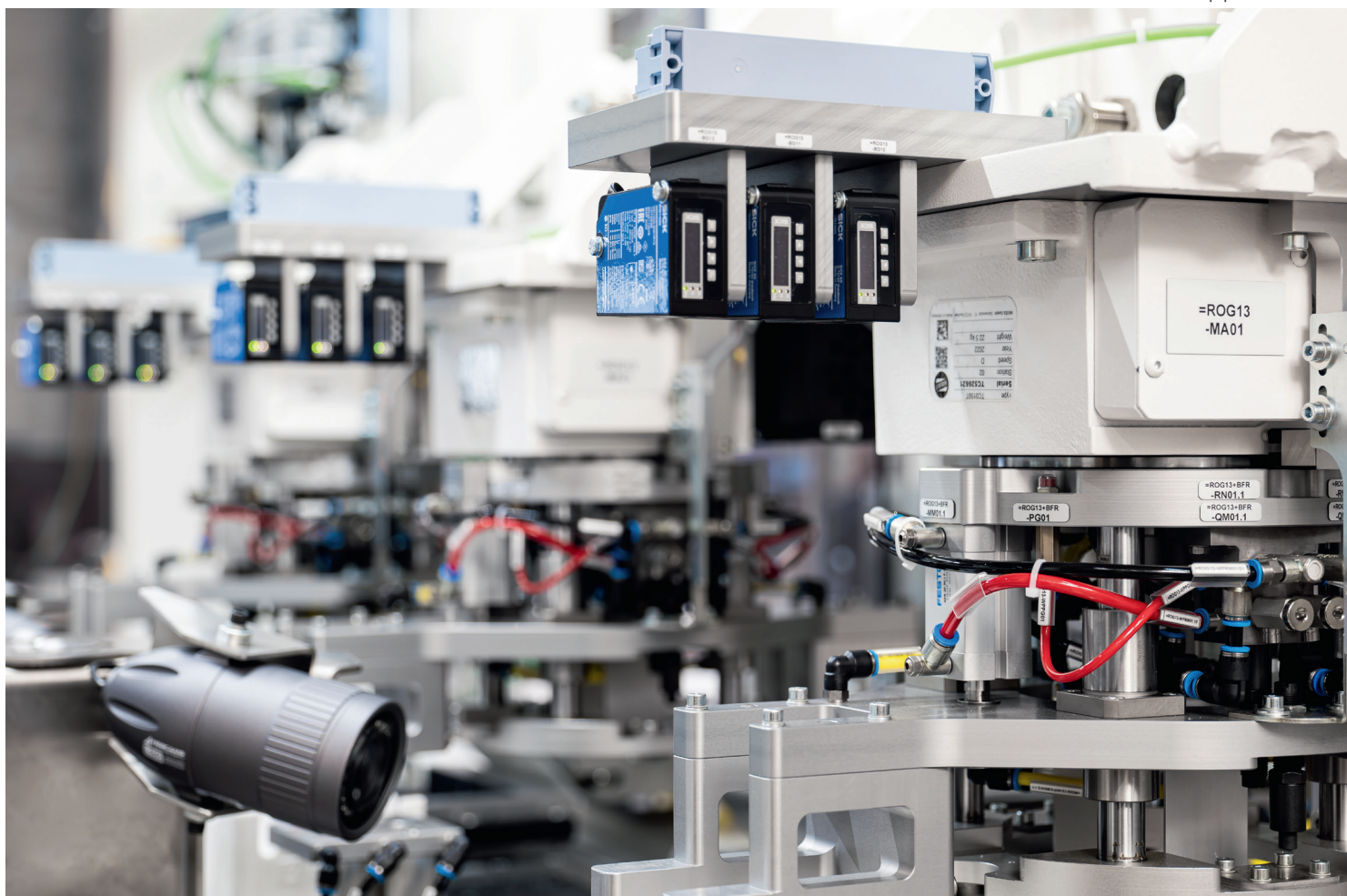
Shingled cell matrix

Shingled-cell interconnection sees silicon cells cut into strips, laid out with a slight overlap and connected to each other using an electrically conductive adhesive. M10's approach optimizes this further, placing cell strips in rows vertically offset from each other, with individual rows connected in series, and adjacent rows connected in parallel, so that current can flow across the entire module surface.

"The advantages are, on the one hand, a much higher power yield when the modules are partially shaded and, on the other hand, a valuable appearance in combination with easy scalability of the module size," the company explained when it announced the start of operations for its pilot line earlier this year. "This will open up new areas of application in building and vehicle integrated PV."

The "Surface" tool can process up to 12,000 cell strips per hour, and can adapt to producing modules in almost any size – from small roof tiles up to full size modules measuring more than 1 meter by 2 meters. Cell strips can also be placed with a distance of up to 3 cm between them, opening up design possibilities for partially transparent glass-glass modules.





M10's tool can process up to 12,000 cell strips per hour, and is compatible with all silicon cell types and formats on the market.

M10 Solar Equipment's business development manager, Michael Kröffges, is also keen to point out that the Surface tool is compatible with all cell types including PERC, TOPCon and heterojunction, and can also work with all wafer/cell sizes including the 210 mm x 210 mm that is currently the largest on the market. The Surface tool can also work with potentially even larger and non-square formats as well.

"As a manufacturer it's important to be future proof," said Kröffges. "And with our tool it doesn't matter if the cell size or technology or anything else changes, customers can feel safe that they won't be needing a new tool just a couple of years down the line."

Market approach

Zahn said that since M10 fired up a demonstration line for the tool earlier this year the company has already seen huge demand for its solution, though it plans on a careful scaling up of production to ensure quality of booth tools and service are maintained.

Since the flexibility of the tool makes it ideal for manufacturers working with custom sizes, M10 is initially looking to producers in the building-integrated PV segment, who may one day have an order for small solar roof tiles, and the next be working on enormous glass facade elements. But the company also reports interest from manufacturers working on more standardized PV modules, and also from other emerging novel PV applications.

With the pilot line up and running in Freiburg, they can work with these customers and adapt the process to produce any module type. And here M10 can also leverage its years of experience in the PV industry to provide both advice and contacts on integrating other production stages into what may be a less conventional approach. "The people are coming in and they have done their homework, they know about our technology and the values which Fraunhofer ISE has published," said Zahn. "They want to come and see the machine, find out if it is real. And once they get here, they say 'hey, it's even better than what I had in mind.'" [PV](#)

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