Laser welding in the solar boom

The Dresden-based specialist contract manufacturer CooolCase is combining its many years of expertise in housing construction with new triple welding power for aluminium. The solar industry is booming, which means significant numbers of affordable inverters are required to convert the electricity from solar panels for power grids. Melinda Krusemark, Sales Manager at CooolCase, is delighted: "Inverter housings are an important quality and cost factor. They are particularly complex parts made of different aluminium alloys. The laser is the perfect tool, and we have found an ultra-productive way of using it."

CooolCase GmbH

https://www.cooolcase.com/

The Saxon family business CooolCase has a 30-year history of manufacturing mechanical housing solutions for electronic components. With its 100 employees, CooolCase supports its customers from product development through to manufacturing. Now, with Melinda Krusemark and Marvin Michel, motivated young talent is stepping into the boardroom – and making their mark in the solar industry with a major order.

INDUSTRY
Contract manufacturer

NUMBER OF EMPLOYEES
100

LOCATION
Dresden (Germany)

TRUMPF PRODUCTS

- TruLaser Weld 5000
- TruMatic 7000
- TruLaser Cell 7020
- TruBend 5130
- TruBend 7036
- Truma Bend V 85
- TrumaBend V130

APPLICATIONS

- Laser welding

Challenges

The German energy transition requires the mass use of solar energy systems. The inverters required for this purpose house sensitive electronics and are exposed to wind and weather all year round. To prevent moisture from getting inside and damaging the technology, the housings must be fully sealed, which is why the housings are usually cast. As quantities increase, cost becomes an increasingly important factor. This is why a major German company specialising in power inverters has been searching for – and has found – expertise in large-scale alternatives with CooolCase. Melinda Krusemark, sales manager at

CooolCase, explains: "With around one hundred employees, we are actually too small for a job like that." But the family-owned company didn't hesitate for long before accepting the challenge. Marvin Michel, Chief Financial Officer at CooolCase, is pleased: "We are one of the few companies in Europe that can weld aluminium housings to this standard."

"We never imagined that our bold investment in new technology would pay off so well!"

MELINDA KRUSEMARK

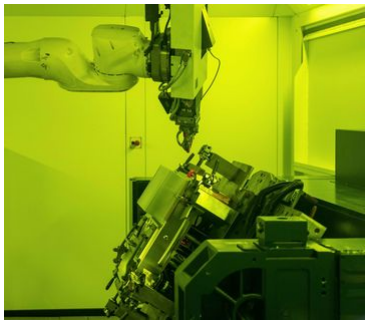
HEAD OF SALES AND MARKETING AT COOOLCASE

Solutions

"Laser technology is the key to overcoming traditional hurdles in the manufacturing process and making the product ready for mass production," says Marvin Michel. "Welding represents an extreme cost reduction compared to the casting process. We use about 50% less material per housing, as we can make the walls significantly narrower."

Implementation

This is all possible because CooolCase opted for the TruLaser Weld 5000, which can handle all the steps required in the process. Despite the economic advantages of laser welding and its seemingly simple appearance, welding an inverter housing is far from trivial. The part involves three tricky welding tasks, requiring CooolCase to leverage all its expertise. First, there are the seams on the sides, including the i-seam and the rounded corner joints. Here, CooolCase relies on precisely controlled heat conduction welding, which introduces minimal energy into the part. "Otherwise, hot cracks could form at the weld seams, leading to leaks," explains Michel. Secondly, a stiffening plate must be welded onto the housing. To achieve this, the laser system switches to deep penetration welding, whereby the laser light penetrates two millimetres of aluminium, creating a consistently tight seam that prevents any H_2O molecules from passing through. Now comes the welding highlight – CooolCase attaches a heat sink to an opening on the roof of the housing, which will later prevent the inverter from overheating. For production-related reasons, this heat sink – an extruded profile – is only available as a 6000 series aluminium alloy. "It is particularly hard and prone to hot cracks, and that is precisely what must be avoided at all costs with the housing. As if that weren't challenging enough, we have to weld a tough 6000 series aluminium to another aluminium alloy – and it has to be absolutely leak-proof, of course." That's why the TruLaser Weld 5000 switches welding methods once again, now adding a filler wire using FusionLine. "It has to be similar enough to both alloys. Finding the right welding parameters was a delicate balancing act. Fortunately, we had a strong partner in TRUMPF to support us!", says Michel. The feat is accomplished and the TruLaser Weld 5000 processes one housing after another on a rotary table.



Forecast

CooolCase significantly increased its productivity in a short period of time: "When we started developing the process for the inverters, we were producing two parts per day. Working with TRUMPF, we have optimised our production to such an extent that we can now produce 100 parts per day! The welding time per part has also exceeded our expectations. We had calculated around seven and a half minutes per part. However, after making some adjustments with TRUMPF, we now need just five minutes to produce a housing." For siblings Melinda Krusemark and Marvin Michel, the major order for the inverters is a particular source of joy, as they have only just taken over company management from their father. And this one order alone offers solid prospects for growth. Melinda Krusemark says: "The hard work and investment has paid off."

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