



Bending, welding and more

The Pulsspeed Bender simultaneously lays and welds the tube for a solar absorber meander. A roller presses the absorber tube onto the absorber plate so that the laser can exactly carry out its welding.

Photos (2): DTEC/TISUN

Since October, TiSUN has been manufacturing its absorbers with a special machine, the Pulsspeed Bender. It forms the meander while simultaneously welding it to a plate and then welds on the manifolds.

Where other absorber manufacturers generally require several machines to manufacture absorbers, TiSUN GmbH in Söll, Austria, requires just one. It can do everything: cut, bend, weld, solder, check. It even gets its working material itself. It thus pulls in an aluminium sheet from one of the four sides of its housing using a standard material roller, sends it first through a cutting machine which can cut both lengthwise and sideways, and then onto a worktop, cut to the dimensions programmed into the machine. From the other side it gets the first manifold for the absorber and clamps it to the plate. Then the machine's tool head, which contains laser optics among other things, moves into position and starts to weld the tubing, whether it be of copper or aluminium, to the absorber plate. When it's done, it switches its optics over to the smaller diameter of the meander tube and can begin to weld this tube to the aluminium plate every three millimetres too.

"The special thing about this machine is that when lasering under CNC control, the shape and geometry of the meanders can be freely programmed. This is not possible with conventional bending and laser-welding

machines," says Michael Dietl. His company DTEC GmbH developed, made and put together the novel, patented absorber manufacturing machine. In the TiSUN manufacturing hall Dietl points to a guide which feeds a rolled up copper tube from a coil to the tool head. At the same time, the tool head can go in a straight line from one of the long edges of the absorber plate to the other, press the copper tube onto the plate and fix it with powerful laser pulses from the optics supplied by Trumpf. When it gets to the other long edge of the plate it turns, thus bending the tube. It doesn't stop welding during the bending either. Then the worktop pushes the absorber plate forwards below the tool head. Bend thus follows straight and straight follows bend until the meander is complete. At the lower end of the absorber plate the machine fetches the second manifold and switches the laser optics back to the larger diameter.

Merging processes

The idea for the Pulsspeed Bender, as Dietl named the machine, was developed by him together with the

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Technical Director of TiSUN, Arnold Teufel. “The cooperation with TiSUN was interesting because Mr. Teufel is a visionary,” says Dietl on the development phase. One year ago he had told him that a machine which could simultaneously bend and weld would be a technological breakthrough in absorber manufacturing. With such a machine one could do away with the huge bending tables so far required for the bending processes in conventional manufacturing. Manual handling and complicated logistics would also fall by the wayside. Dietl and his team of specialists then began to develop such a machine and make one for TiSUN.

This has now stood in the TiSUN manufacturing hall making absorbers since October. The laser-

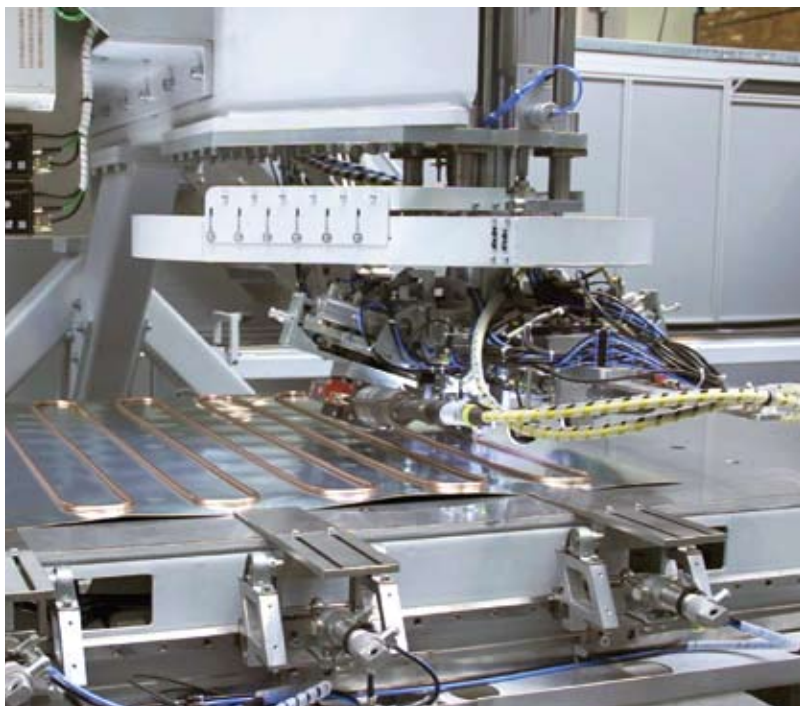
welding technology has convinced Teufel. “With laser welding you are talking about a process which stays absolutely the same, as you can join many materials this way. Additionally, it provides a better heat transition. With ultrasonic welding you weaken the absorber plate at exactly the point where most heat has to flow,” he explains when saying why he prefers melting metal with amplified pulses of light. He also says the ability to weld the meander bends with the new machines is an advantage: “We get 5 to 6 % more power; we’ve measured it.”

Second laser source increases output

Behind the protective casing of the Pulsspeed Bender the worktop moves on towards a soldering station with the welded absorber. It joins the meander pipe with the two manifolds. “The soldering machine can automatically adjust to different combinations of material, regardless of whether this be copper-copper, copper-aluminium or aluminium-aluminium,” explains Dietl. The flame can be adjusted to suit different material combinations by means of special controllers. Before the absorber can leave the machine, it is docked to a measuring station which checks for leaks using a special pressure differential procedure. The worktop then moves the finished absorber to the removal point where an employee receives it.

This happens twenty times an hour; i.e. the machine makes an absorber every three minutes. TiSUN can increase the output if it increases the laser power. “The machine is constructed in such a way that TiSUN only need buy a further source to increase the output. Then it can run at twice the speed,” says Dietl. Either way, one employee is all that is required to keep the absorber manufacturing going. He must make sure that there is always enough material available for the machine to work with, check that the machine is running the right programme and step in if there is a breakdown. Everything else – the cutting, bending, welding, soldering and checking – is carried out by the machine.

Joachim Berner



The tool head of the Pulsspeed Bender manufacturing unit carries the laser optics and a bending tool.



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TiSUN has been developing and selling complete solar thermal systems for over two decades. Arnold Teufel and Gerhard Schwarz set up the company in 1989 under the name of Teufel & Schwarz. They produced the first of their own collectors seven years later. In 2006 Robin Welling joined the company as the third company head. With him acting as head of sales, the company began to expand its business internationally. They named their brand and then renamed the company TiSUN. Today the company is active in 44 countries around the world, exports 80 % of its products and employs 60 sales personnel in Europe. 120 employees work at the company site in Söll. TiSUN has been making its own absorbers with the Pulsspeed Bender machine since October 2011.

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