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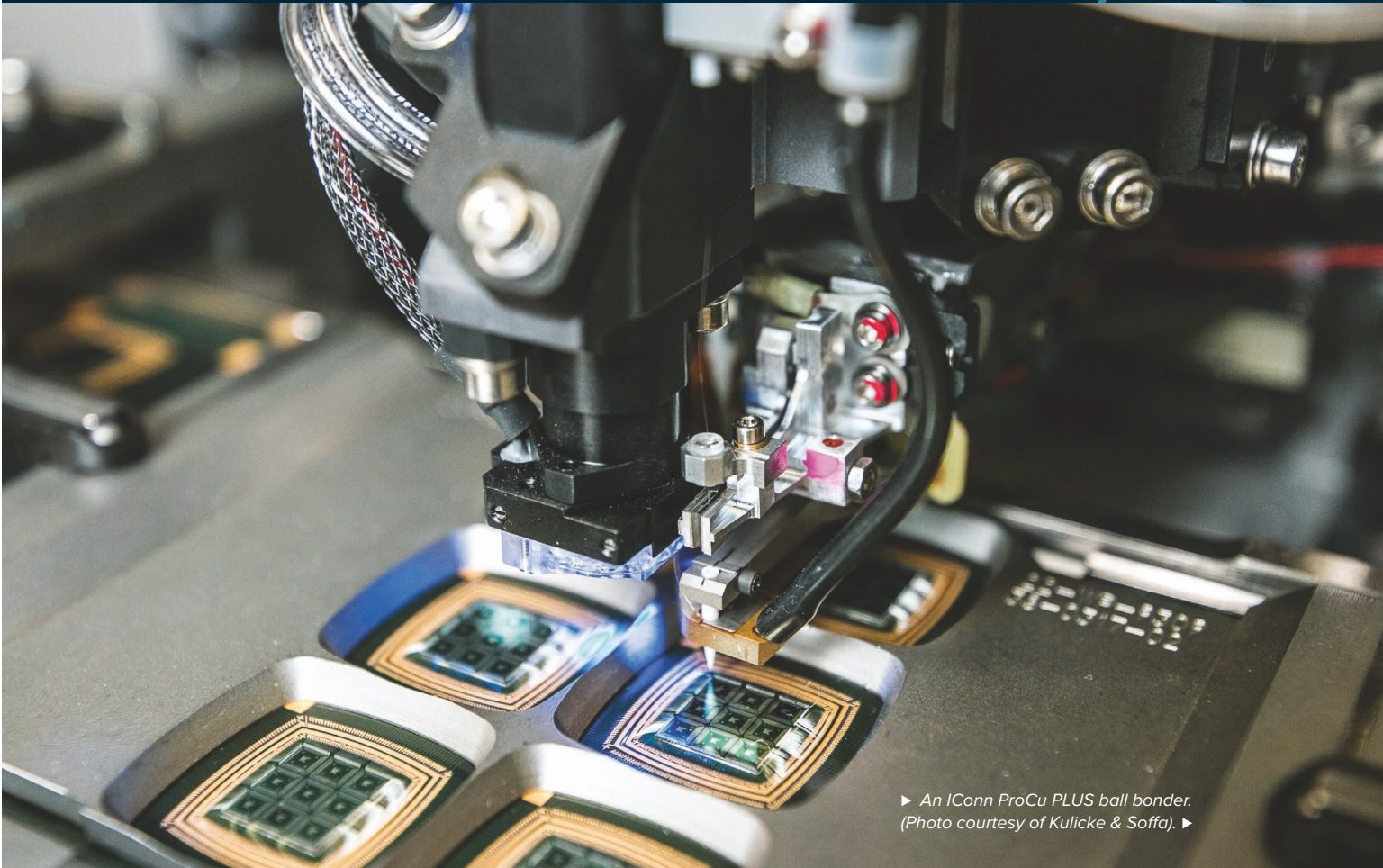
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# Alter Technology UK takes on new business following purchase of K&S IConn ProCu PLUS ball bonder from Inseto



► An IConn ProCu PLUS ball bonder. (Photo courtesy of Kulicke & Soffa). ►

**A**lter Technology UK—a UK-based provider of contract package design and precision assembly services for optoelectronic, microelectronic and MEMS devices—has expanded its manufacturing capabilities having invested in a Kulicke & Soffa (K&S) IConn ProCu PLUS ball bonder. The company had been looking to secure new business and so purchased the ball bonder on the recommendation of UK-based Inseto.

Alter Technology UK is an Alter Technology TÜV NORD Group company. It provides end-to-end backend semiconductor manufacturing, from wafer singulation to assembled product. The company's intellectual property (IP) process enables customers to reduce development



and manufacturing costs as well as time to market. Furthermore, it recently attained AS/EN9100 quality management system (QMS) for aviation, space and defence, a series of standards based on ISO 9001. Matt Booker, head of sales and assembly services at Alter Technology UK, commented: “We’re the only packaging company in the Alter Technology TÜV NORD Group, and we serve worldwide markets from right here in the UK. Product volumes range from 10 devices to a few tens of thousands. Most of the work we do is for customers directly, but we also enable our parent company to take on projects that require off-the-shelf devices as well as custom-packaged chips.

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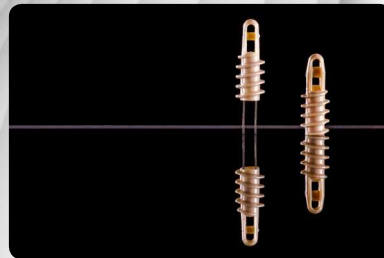
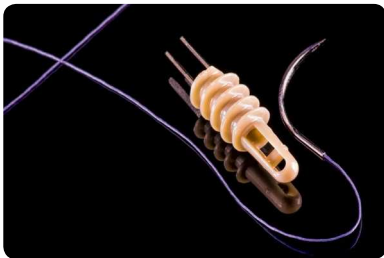
Alter Technology UK has a Class 10,000 cleanroom and specific areas therein achieve Class 1,000. There is also a designated grey area for activities such as wafer sawing, destructive testing and cross sectioning/polishing.

Equipment used in the company’s manufacturing processes includes dicing saws, pick-and-place machines, wire bonders, plastic injection moulding machines and hermetic sealing machines. Ancillary equipment used to validate the manufacturing processes includes a non-contact metrology system, an x-ray machine and a destructive test system.

Alter Technology UK also has a ball bonder that it bought new and has provided over 10 years of service. A ball bonder is a type of wire bonding



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► The IConn ProCu PLUS was installed in Q3 2019. Training was provided by both Inseto and Kulicke & Soffa.►

Another advantage of the IConn ProCu PLUS highlighted by Robertson is its ability to perform copper ball bonding. This is typically undertaken as a cost-reduction exercise for high-volume products.

machine. It works by melting the tip of the wire to create a ball, which is then placed to make the first contact. The wire is then drawn to the second contact point. The advantage of a ball bonding process over a wedge bonding process is that the wire can be taken in any direction after the first bond, which leads to a much faster process.

The company realised that its ball bonder lacked features that prevented it from bidding on some projects and made the decision to invest in a second, more capable machine in early 2019. Booker explained: "A new and more advanced machine would help us respond to requests for quotations and pursue new kinds of work. There's also the benefit of equipment redundancy through having two machines that can do much of the same work, particularly seeing as our original ball bonder was running at near full capacity."

Alter Technology UK turned to its long-time and trusted equipment supplier Inseto for guidance. Inseto recommended the K&S IConn ProCu PLUS automatic ball bonder, which has a 56 by 90 mm bonding area for X and Y axes, respectively, and a total bond placement accuracy of 2 µm at three-sigma. The wire sway is 25 µm at three-sigma for wire lengths shorter than 2.54 mm and +/-1 percent of wire length at three-sigma for longer wires.

The IConn ProCu PLUS has an ultra-fine wire bonding capability of 40 µm pitch for 15 to 30 µm diameter copper wire, and a gold wire bonding capability of 35 µm pitch for 15 µm diameter gold wire. Furthermore, it has an impressive looping capability of 7.6 mm in length for 25 µm diameter wire and 3 mm in length for 15 µm diameter wire. Ultra-low loops of 40 µm high can be achieved for 15 µm diameter wire and 80 µm high for 25 µm diameter wire.

The new ball bonder can also perform stand-off stitch bonding, where a bump is placed on the die pad first and then the wire bond is made from the package (where the ball is placed) to the bump on the die.

The IConn ProCu PLUS was installed at Alter Technology UK in Q3 2019 and immediately put to good use. Stephen Robertson, engineering manager at Alter Technology UK, commented: "For one customer, we've been manufacturing LED arrays that are about 1 square in. in size and have 96 LEDs each in relatively high volumes since mid-2016. The IConn ProCu PLUS can do the complete bonding for a chip—so that's pattern recognition to find two fiducials on each of the 96 LEDs and make the 192 bonds at a rate of about six bonds per second—in less time than our older machine takes to just perform the alignment."

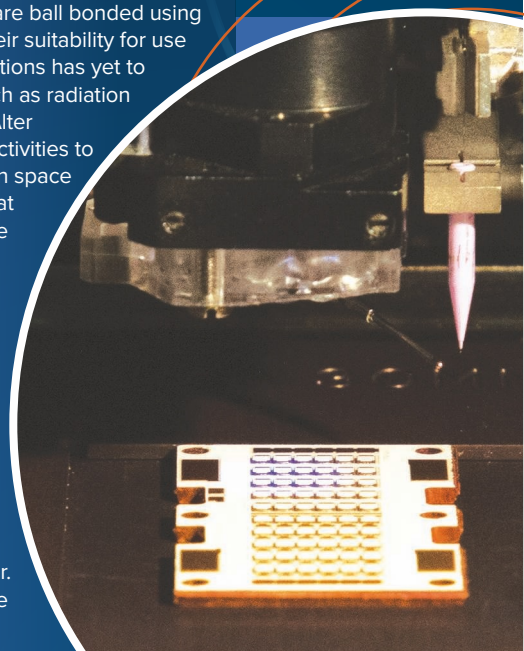
According to Robertson, the biggest benefit of the IConn ProCu PLUS is probably its ability to bond using 50 µm

wire. This is beneficial for high-power applications where high-current carrying capacity is required. Since taking delivery of the new bonder, Alter Technology UK has received several enquiries for bonding and packaging high-current die, one of which is for a silicon carbide (SiC) Schottky diode for a space application that will be rated at 60A.

Another advantage of the IConn ProCu PLUS highlighted by Robertson is its ability to perform copper ball bonding. This is typically undertaken as a cost-reduction exercise for high-volume products. However, Robertson, a member of the ESA Hybrid & Packaging Working Group, pointed out that despite the fact that an increasing number of commercial off-the-shelf (COTS) components are ball bonded using copper as opposed to gold, their suitability for use in high-reliability space applications has yet to be proved because factors such as radiation hardness must be evaluated. Alter Technology UK is involved in activities to evaluate copper ball bonding in space applications and anticipates that having this capability will create new business opportunities in the near future.

Robertson also reported being impressed by the new ball bonder's automatic load feature, since this is proving to be of great benefit on higher volume projects. Automatic loading requires devices to be placed on lead-frames, or strips, in a cassette on the input side of the bonder. These strips are drawn into the

► The IConn ProCu PLUS being used at Alter Technology UK to fully automatically wire bond a 60 LED array.►



bonder and indexed through to the bonding area for automatic alignment and bonding. The bonded strips are then fed into the output cassette.

Alter Technology UK operators are more familiar with the older ball bonder and write many programs every week for low-volume work to be undertaken on it. On the other hand, the new ball bonder is being used for an increasing amount of relatively high-volume work and around 10 programs have been written for repeat orders.

In Robertson's opinion, programming of the IConn ProCu PLUS is easier. More operators are to be trained on the new ball bonder in the near future, enabling it to also be used for low-volume and custom work as well as provide equipment redundancy should the older ball bonder go offline.

Alter Technology UK predicts a quick return on investment, realised through reduced manufacturing turnaround times, which will enable the company to take on additional work, and taking

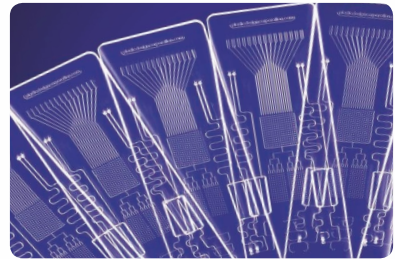
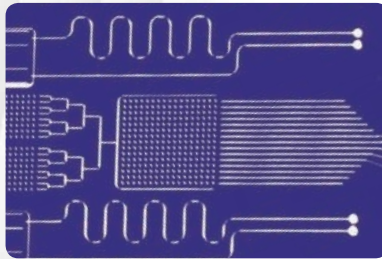
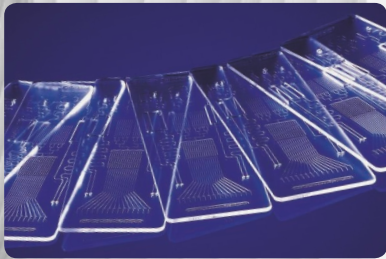
on more space application projects, which are typically high value and for which it is expected that copper ball bonded COTS components will be proved suitable.

Robertson concluded: "Inseto and K&S have been extremely responsive throughout this entire engagement, from understanding our requirements and recommending a best-fit solution through to making sure we have the relevant training and continue to be happy with our investment. Inseto, in particular, is a key supplier. They're our first point of contact and we trust their views." ●

**Alter Technology UK**  
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