TELSONIC
ULTRASONICS

Telsonic's SONIQTWIST® Energises Automotive Battery Cell Production

PLASTIC WELDING | METAL WELDING | CUTTING | CLEANING | SIEVING

There is no question that Electrically Powered Vehicles (EV's), and Hybrids will continue to play an increasingly important role in the future of both personal and commercial transportation. For the individual consumer, our experience of the Electromobility sector is generally limited to the purchase of a particular car, based upon the criteria which are important to us personally, such as price, range, specification, and colour.

Behind the scenes, however, there is a complex series of multiple manufacturing processes which eventually come together to produce the finished vehicle. In the case of EV's, the manufacture of the individual battery cells, which ultimately provide the motive power for the vehicle, is a key part of the overall manufacturing process. As the EV sector has evolved, so too has the battery cell format and technology. Some battery packs are made up of "Pouch Cells" or "Prismatic" Cells, however, the industry is increasingly turning towards the use of "Cylindrical" Lithium-Ion battery cells as these are much easier and cheaper to produce in the volumes required. Depending upon vehicle model and manufacturer, on average, an EV may have anything between 1,000 and 9,000 incividual battery cells installed within its battery packs.

With the ongoing increase in the uptake of EV's and, given the number of individual cylindrical battery cells required per vehicle, the manufacture of these cells requires high speed, state of the art technology. As for other products which are manufactured in high volumes, continuous, syncronous rotary assembly technology is used to produce these essential items. This manufacturing concept allows multiple individual battery cells to be processed simultaneously and at speed.

There are of course a number of different manufacturing stages in the production of the cylindrical battery cells, each of which requires different processes to be performed. The arcitecture of the cylindrical Lithium-Ion battery comprises of a series of flat, layered anodes and cathodes, isolated from each other by separation layers. These combined layers are then rolled together to produce what is known as the "Jellyroll". This in turn is inserted into the cylindrical outer casing. There are a series of other operations required to complete the process, including welding the positive terminal, cover and washers within the "Jellyroll & Can" assembly.

The technology used to perform these welding operations must of course not only produce the highest levels of consistency and quality, but also be capable of operating at the high cycle rates required to keep pace with production demands. This is where Telsonic's SONIQTWIST® ultrasonic welding process, already established as a reliable and proven technique within the automotive sector, is now also fast becoming the process of choice for a growing number of battery cell welding applications.

Of course there is often the debate as to whether ultrasonic or laser technology is the optimum solution for battery welding aplications, however in many cases ultrasonics offers a number of distinct and

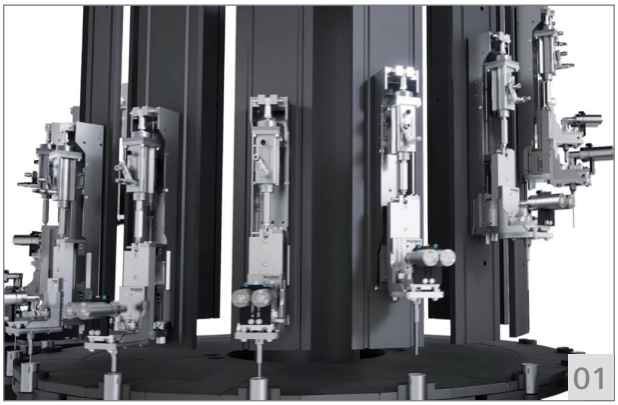
significant benefits. Ultrasonic welding is typically more cost-effective than laser welding, as it does not require high-powered laser sources or complex beam delivery optics. The initial purchase price and subsequent total cost of ownership of ultrasonic welding equipment is, in the majority of cases, much lower than that of the laser welding alternative.

Although laser welding produces a smaller heat affected zone around the weld area than other more conventional welding processes, ultrasonic welding, and Telsonic's gentle SONIQTWIST® ultrasonic welding process in particular, generates even less heat than laser welding. This significantly reduces the potential for distortion or heat damage in the area surrounding the weld, making the process ideally suited to applications where delicate materials or sensitive components are present. Another well-established feature of the technology is Telsonic's Telso®Flex operating software which facilitates efficient production monitoring and logging of the ultrasonic welding application. An intuitive user interface, with user and rights management, displays only the information relevant to the user. Production data and values from various sensors are available for digital data logging and process evaluation purposes.

In addition to its commercial, performance and quality benefits, the compact and modular nature of the technology means that the ultrasonic process is also very easy to automate. This attribute makes it the ideal solution for integration withtin the continuous, syncronous rotary assembly systems use in the production of the battery cell "Jellyroll", where multiple welding sonotrodes can be integrated within a continuously rotating turret style system to achieve the throughput required.

In keeping with the overall environmental objectives of e-mobility, the ultrasonic process itself is also environmentally friendly, being an on-demand system with low energy consumption levels. In addition, and unlike laser welding, the ultrasonic welding process requires no personal protection equipment for eye safety, nor does it produce any hazardous emmissions or waste.

By Dirk Schnur, Chief Marketing Officer at TELSONIC Ultrasonic and Tom Pettit, Genesis Sales & Marketing Limited



01 Ultrasonic technology can be easily integrated within the high speed automation systems used in the production of cylindrical EV Lithium-Ion battery cells

02 Comprehensive process controller with MAG Weld Controller
The cross-network, real-time data exchange and enhanced functionality provided by MAG Weld Controller, in the form of smart data handling, transparency, traceability, and error prevention will be a valuable asset to manufacturers seeking to digitalize their production processes for the Smart Factory of tomorrow.