

Bright minds with ultrasonics

A New Zealand manufacturer of multifunctional baseball caps is opting for the ultrasonic welding technology of RINCO ULTRASONICS AG.

While typical welding applications are to be found primarily in areas such as the automotive, packing or textile industries, as well as in medical technology, items for the leisure and adventure sector are not one of the classic applications. This case concerns a baseball cap with integrated, solar-powered LEDs which act as headlamps in the dark - a patented product from the company *2cLight*.

Sensitive high tech electronics

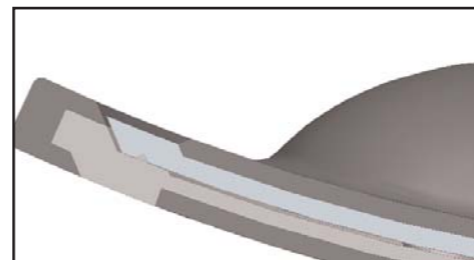
A built-in electronics board takes over the energy management and control of the different light modes. The board is permanently welded into the two-part visor made from PPC material, making it dust- and water-proof. In addition to qualitative requirements, the welded seam is also subject to visual specifications. No bubbles

should be visible on the seam on the transparent sun visor and the plastic should not be stained a milky colour. Alternative welding processes such as hot plate-, vibration- or laser technology were rejected after the evaluation phase. It was particularly the low investment and operational costs as well as the short welding cycle times of 3-4 seconds which tipped the balance.

Left hand: The high tech LED baseball cap with the welded two-part sun visor made from Polypropylene Random Copolymer (PPC).

Firsthand application-specific advice

RINCO ULTRASONICS AG was involved as early as the design and project phase and full use was therefore made of the applications engineer's profound specialised knowledge and its many years of experience. Thus it was possible to adapt the design of the join area to suit the requirements of ultrasonic welding technology in order to achieve ideal welding results.



Cross-section of the seam geometry of the PPC half shells

Is ultrasonic welding of PPC possible?

Polypropylene Random Copolymers (PPC) are polypropylene, where the structure has been changed due to incorporation of another monomer molecule, generally ethylene. High transparency, flexibility, impact strength and a reduced melting point compared to PP-homopolymers are characteristics of PPC. As a result of its high flexibility, the soft material is regarded as problematic for ultrasonic welding. Nevertheless, the engineers at RINCO ULTRASONICS AG succeeded in designing the welding tools so that the application could be carried out without any problems using the 20kHz ultrasonic welding machine *Dynamic 3000 Series*.



Visually perfect ultrasonic welding seam

Tool construction as the focus

One very important aspect is the coordination between the ultrasonic welding machine and the tool, the so-called horn and anvil. The anvil ensures the correct and precise placing of the two sun visor halves with the sensitive electronics board. The height difference (concavity) of the sun visor was a particular challenge, as the acoustic laws of tool design set certain limits. The parts are co-injected with PPC being the primary material, and a soft-touch thermoplastic rubber being the secondary material. This soft-touch material adjacent to the welding seam, which has a design function, made the construction and manufacture of the two tool forms even more complex.

Right hand: One half shell contains the LEDs and the other the solar panel



The application is carried out in two process steps with mirrored tools.

Consultation and technology from one source

Due to the many years of experience of RINCO ULTRASONICS AG in application technology consultation and solution development, combined with innovative ultrasonic welding machines and know-how in tool construction and manufacture, it was possible to produce this multifunctional LED high tech baseball cap economically, cost-effectively and with perfect quality. *2cLight* produces up to 500,000 items a year and is extremely satisfied with the welding results.

Solution:
RINCO ULTRASONICS AG, Switzerland

Partner:
TECHSPAN GROUP, New Zealand & Australia

User:
Talbot Plastics Limited, New Zealand

End customer:
2cLight Company Limited, New Zealand



Dynamic 3000 Series

This servo pneumatic-controlled 20kHz welding press with process-optimised force profiling and integrated speed and force control is suitable for medium- and large-scale welding operations and for textile die-cutters.

In order to give the multi-phase structure of semi-crystalline polymers maximum welding strength, Dynamic Series

presses are equipped with force profiling, by means of which plastification can be adjusted during the welding process. Due to the peripheral software, ACUCapture und ACUremote, developed by RINCO, parameters, measured values and graphics can be transferred to external PC networks, statistically evaluated and changed online, making remote maintenance an option. This form of data evaluation is vital for future-oriented pro-



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