

ENRX

Induction bonding

PRIMARY METHOD FOR ALUMINIUM AND STEEL PANEL HEATING





The world's no. 1 induction curing supplier

Within the automotive industry, induction curing of panels is currently the primary method of choice for pre-curing adhesives and sealers for automotive closure components. With the need for high production rates, the process of induction curing is able to meet or exceed the production requirements of the industry.

Induction bonding uses induction heating to cure bonding adhesives. Induction is the main method for curing adhesives and sealants for car components such as doors, hoods, fenders, rearview mirrors and magnets. With the increasing popularity of electric vehicles (EVs), induction bonding is also being explored for use in bonding components of battery packs. Induction also cures the adhesives in composite-to-metal and carbon fiber-to-carbon fiber joints. There are two main types of automotive bonding: spot-bonding, which heats small segments of the materials to be joined; and full-ring bonding, which heats complete joints.



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Spot bonding with the U-coil

With the correct coil type and application, spot-bonding is the ultimate choice in any situation where handling, finessing and transportation strength are the process requirements.

The theory behind the U-Coil is simple but was borne of many years fighting the strength verses distortion battle. The panel is heated uniformly and in the event that there is some change in the panel geometry or if the panel moves slightly during heating, the coil simply follows the panel. The panel is typically not clamped and therefore there are no stresses introduced, which means panel distortion is virtually eradicated. Even when heating aluminium assemblies, the process is repeatable, robust and flexible. Continual "fine tuning" is just a bad memory. Spot-Bonding has finally become the process it was meant to be.

Spot-Bonding systems are not limited to utilising the U-Coil, in some situations a simpler coil that heats from only one side may well be the best solution.



ALUMINIUM HOOD BONDING TOOL: Note the absence of clamps, minimal nest and relatively small curing areas.



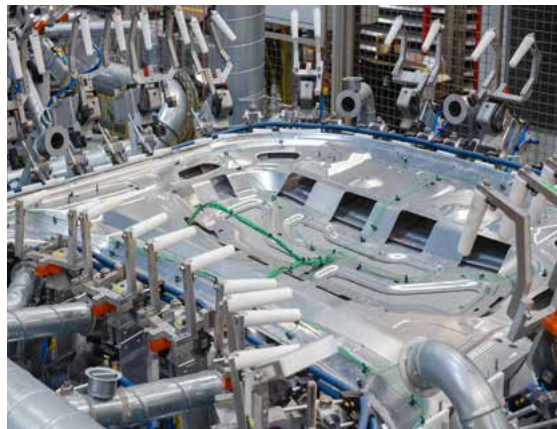
Induction is the preferred bonding method in the automotive industry.

Full-ring bonding with two-turn flexible coil

Despite the many advantages of spot-bonding with U-Coils, there are still many processes that require full-ring bonding. One of the main reasons for its use would be in situations where over-hem (cosmetic) sealer is applied by robot in the curing station. In this case, the hem must be heated within a narrow temperature range to ensure that the sealer is in a robust, non-tacky condition but not over-heated which is likely to cause porosity and adhesive failure. With so many points to be aware of, it is important to choose the most robust and forgiving induction heating system.

Today, a two-turn coil made out of a flexible high temperature hose is used for this application. The two-turn coil is easier to install and tune compared with single turn coils, and the sensitivity to panel movement between the two turns has been drastically reduced. This is due to the magnetic field around the two leads that provides a very similar flux path on both sides of the hem.

Also, the heat distribution around the circumference of the panel can in most cases be easily adjusted with minimal deviation. The coil is infinitely adjustable. Due to the flexibility of the coil, no part-specific coils are required, which also reduces the need for spare coils. One size fits all. The coil can easily be replaced. When the water is turned off, the coil snaps out of the mounting brackets if squeezed. The only tool needed is a wrench for the power/ water connection in the heating station, which is located in the bonding tool.



FULL-RING: Bonding with two-turn flexible coil.



ENRX is the world's largest induction curing specialist.

Heating process

In a typical heating cycle, the temperature is rapidly ramped up to the specified curing temperature. After the temperature is attained, power levels are reduced to maintain the ideal cure temperature within the joint for the period required by the adhesive and when applicable the sealer, to achieve necessary cure. Ramp times can be infinitely variable from approximately one second upwards.

Process supervision

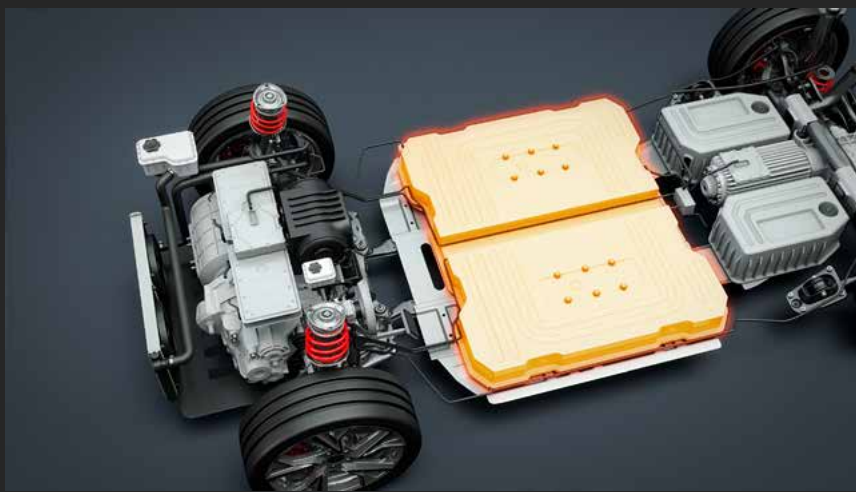
To ensure that panels are properly cured, the induction curing equipment is supplied with an energy supervision circuit. This circuit monitors the energy input in each assembly. If pre-set limits are exceeded, an alert signal is activated. This system has proven precision and better repeatability than direct temperature sensing systems. Any abnormalities in coil setting, heating cycle or panel location will give a deviant energy consumption reading and trigger the alert signal. Temperature controlling or monitoring systems can also be incorporated as required to ensure best process and/or customer specification.

Different bus interfaces including Ethernet are available for process control, upload/ download of system setup and backup capabilities.

Tooling

In-house design and manufacturing capabilities in our Norway, Germany and USA operations offer a full service capability to customers seeking the optimum in performance and process security.





Bonding of battery chassis and cooling chambers



Bonding of bonnet



Bonding of bumpers



Bonding of tailgate



Bonding of doors and subcomponents



About ENRX

ENRX is a global green tech company driven by induction. We offer induction heating, wireless inductive charging and contactless power supply with low or no carbon footprint for virtually any application within mobility and manufacturing.

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