



Press release

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R&D Cooperation with Henkel pays off

Corrosion Protection in Light-Weight Construction

The combination of materials is gaining importance in the light-weight construction of automobiles. In particular, aluminium sheet constructions are used for the weight reduction of car bodies. The corrosion protection in contact areas is a major challenge. Henkel has taken care of this issue in a joint project together with partners in industrial and institutional research, and has developed a new surface technology. Granocoat LT renders a corrosion resistance that was previously unachieved.

Requirements continue to increase for modern automobiles. High fuel prices, the reduction of emission levels, and the target to improve the recyclability, demand innovative solutions. On this scene, light-weight construction takes an important part in car body manufacture. Modern car bodies, being the central element of a vehicle, but also modular parts like doors, roof, and trunk lids, are being appreciated more and more in view of the weight optimisation. Simultaneously, higher crash resistance is required. Therefore, aluminium-steel combinations are ever more widely used in the premium class segments of vehicle manufacturers. In an R&D cooperation with Audi, the Austrian steel group voestalpine and the Technical University of Vienna (TU Vienna), Henkel has tested the weldable primers of its Granocoat product range that provide primer coatings for corrosion resistant painting and adhesive bonding.

“To guarantee long-term corrosion protection is an important precondition for the use of aluminium-steel couples in the automotive mixed-metal construction. And it is just here where the biggest issues have been”, says Wolfgang Lorenz, former leader of Henkel’s Organic Coatings group. Owing to the different electrochemical properties of steel and aluminium, enhanced contact corrosion is especially often found in areas where metal sheet is tightly joined by adhesive bonding or welding. “Salt water can accumulate in crevices of overlapping sheets, the so-called flanges, under these conditions, forming an electrolytically conductive bridge between the two metals. Just like in a battery, an electric current is induced that destroys the less noble metal”,

Lorenz explains the process. Looking for a solution for this problem, the car manufacturer Audi of Ingolstadt, Germany, turned for help to Henkel and voestalpine, and found it.

Performance Potential

“The aim of this cooperation is the assessment of the performance profile of organic anti-corrosive primers in aluminium-steel mixed construction,” Project Manager Marcel Roth says. Along the test series, the coating technology of Granocoat LT, combined with one of Henkel’s chromium-free pretreatment processes, paved the road to success. The solution that was worked out by Henkel’s experts is based on a zinc-pigmented polymeric resin system that is applied on pretreated, galvanised, cold-rolled steel sheet with a coating gauge of about 3 micrometres. The application of the organic functional coating is carried out already at the steel-maker’s, i.e. voestalpine’s plant, using the coil coating process, prior to the press-forming of the precoated sheet into car body parts. “Post-coating of the finished parts in the automotive plant proves to be much more difficult, if not impossible, particularly in box sections and flanges”, Marcel Roth explains the benefits of the process. The advantages of Granocoat LT paid off already during the manufacturing cycle. Its good lubricating features help a lot during the press-forming. Henkel’s coating technology is truly multi-functional, i.e. it is weldable, bondable with structural adhesives, and electrically conductive, hence also overcoatable by electrocoat paints.

Granocoat LT successfully passed the endurance tests. Researchers at TU Vienna studied the occurrence of corrosion by means of electrochemical measurements, carried out in numerous test series with Audi’s Q7 model. “We equipped the vehicle with test probes and special sensors in different neuralgic points of mixed-metal parts. With these devices, electric corrosion currents and potentials are measured between the various materials”, Günter Faflek explains, Professor at TU Vienna’s Institute of Chemical Technology and Analytics.

Vehicle Safety

The results show that the corrosion resistance in flange areas and box sections is substantially enhanced by Granocoat LT, therefore the vehicle’s value sustained much longer. “The service life and recycling intervals are extended, and moreover, the safety of the vehicle is maintained long-term due to the improved corrosion protection”, says Marcel Roth. Granocoat therefore largely contributes to vehicle safety, environmental protection and, last but not least, the economic efficiency, as it prevents the formation of rust with reduced, or even without, secondary protective measures, like wax flooding or seam sealing. Henkel, voestalpine and TU Vienna have set out to undertake further practical testing, to study extended potential applications of the corrosion-protective primers, and finally, to boost the use of the primer technology in light-weight construction. Weldable primers are a key technology for the aluminium-steel light-weight concepts, in terms of structural bonding and long-term corrosion protection.

Further material is available at <http://www.henkel.com/press>

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Homing in together: Researchers assess the corrosion behaviour of Granocoat LT in Audi's Q7 model.