Energy savings, new design options, sustainable solutions – Henkel offers innovative technologies for modern elevator construction

Adhesives in elevators on the way up

Climbing out onto the viewing platform of London’s new “secret” landmark, the Shard, yields an unforgettable panorama. In fact, the trip to the 244 meter high 68th storey of the skyscraper is an experience in itself. The elevator zips skyward at a dizzy six meters per second. Meanwhile, the London Symphony Orchestra plays sounds specifically composed to soothe the car occupants from the off. For tourists from around the world, this has become an engrossing experience, the full enjoyment of which owes not a little to modern adhesives, sealants and surface treatment technologies supplied by the world market leader in the adhesives field: Henkel.

For years, high-performance adhesives have been replacing classic joining technologies, such as riveting, welding, clamping, clinching and bolting, in many branches of industry and at an ever-increasing rate – because they adapt to any surface finish, quickly cure at room temperature, and take up little-to-no space: as a rule, a thin film of adhesive is sufficient to create a reliable, clean joint.

This trend is also reflected in elevator construction. For many years, adhesives have proven ideal for the fabrication of single- or multi-passenger, load-carrying or goods transport elevators – with the trend still rising. This is because adhesives offer an unbeatable combination of compelling properties. Engineers, for example, appreciate the improvement in stress distribution, particularly over wide surface areas or in those locations exposed to high loading. Operators benefit from a lower level of maintenance requirement, not to mention increased energy efficiency and reduced cost. The elevator passengers themselves are able to enjoy a more exclusive travel experience with attractive interior designs to please the eye. And, finally, manufacturers and their subsuppliers often find that they can optimize processes in production and thus likewise cut cost and energy consumption.
Structural adhesives offer a multiplicity of talents to make much of this possible. The structural adhesive used in the Shard, for example, bonds the door assemblies of the double-deck cars in each of the shafts, exploiting the fact that adhesives make constructions lighter and cause less material attrition.

**Welcome weight loss**

Through the use of adhesives alone, elevator cars can lose up to 20 percent of their weight without suffering any kind performance decline. One of the reasons is that adhesives enable the use of thinner and lighter materials. For example, cars can be fabricated from metal sheets that are only half as thick as those used in conventional designs. As in the case of welding, the adhesive is applied in the non-visible area of the panels. And adhesives in themselves have a stabilizing and stiffening effect on the assembly. However, the real strength and stability of a wall is achieved through the addition of an omega profile bonded to the outside face of the panel sheet. The adhesives selected for such applications are characterized by a strong initial tack.

**Little cosmetic rework required**

As adhesives do not modify the surface of the mating materials, extensive cosmetic rework is no longer necessary. If the panels are bolted or welded, the joints are usually covered by additional cladding, at least in cars expected to hold customers and visitors. This further increases car weight and work input. Clinching is also inferior to adhesive bonding in terms of performance because the material concerned becomes deformed, causing unsightly unevenness in the surface.

The weight savings achieved with such solutions have a direct and positive effect on the energy requirement of elevators. This therefore puts adhesives very much in the frame for the new generation of high-speed elevators being introduced around the world – offering faster starting and maximum speeds so as to ramp up the superlatives and improve attractiveness for customers and visitors. The current record-holders are in Taiwan where elevators catapult their passengers upward at a speed of 60.6 km per hour (approx. 38 mph), corresponding to 16.8 meters per second.
Energy efficiency and environmental compatibility

However, it is not just in speed, comfort and convenience that lighter cars have the upper hand. The same applies in the heavy load segment, where elevators are required to transport sometimes quite huge cargos. Here, the use of adhesives can lead to an increase in maximum payload. And in all other performance bands, the improved energy efficiency results in reductions in resource consumption and operating cost. In view of the fact that – thanks to its reduced weight – an adhesives-assembled elevator requires less electricity to produce the same performance, the use of smaller, less expensive motors may also be considered, for example.

This sea change in joining technologies is also apparent in the design of the electric motors themselves. Increasingly, magnet adhesives are replacing the previously established fixing methods – clips and clamps – in both the rotor and the stator. Moreover, adhesive-bonded magnets promise improved operating behavior and service lifetimes thanks to lower vibration and reduced noise. They are able to withstand thermal stressing, are shock-resistant and are absolutely corrosion-free. In this segment particularly, Henkel offers adhesives regarded as pace-setters in terms of optimizing performance and cost-efficiency.

Adhesives are also able to sustain the trend in – and meet the demand of building owners for – “greener,” more environmentally compatible solutions. The energy savings achieved through lighter car constructions are only one aspect in this context. For adhesives also engender improved resource conservation and cost efficiency because, in contrast to welding for example, they perform their task without the need for an external energy supply. They harden, set and cure completely at room temperature, while in production they ensure shorter cycle times, so contributing to process optimization as well.

Alternative coating processes

The switch to modern, environmentally friendly technologies is also apparent in the case of metal components, whether installed within or outside the passenger cell. One example can be found in advanced nanoceramic corrosion protection technology. With this, Henkel is able to offer metal-processing companies major potential for more efficient and environmentally safe pretreatment processes. Compared to conventional surface treatment technologies, the nanoceramic option reduces process time by up to 50 percent, bringing significant reductions in machinery repair and maintenance, water consumption and waste footprint. As the application of such corrosion protection coatings takes place at room temperature, this technology can also lead to a cut in energy costs of up to 30 percent.
Opening the door to new designs

Metals are unlikely to lose their dominance in elevator construction any time soon. However, other materials are gaining in attractiveness. More and more frequently, glass, plastics and LED installations are being incorporated within elevator cars to create an exclusive atmosphere. In addition, the lightweight construction methods made possible by adhesives create new scope for creative design. With adhesives, development departments may, for example, find they can connect desirable materials without the need to drill or weld. This gives rise to material combinations beyond those conventionally applied. And Henkel offers high-performance adhesives for all kinds of decorative materials such as glass (mirrors), plastics, marble and painted and powder-coated surfaces. They durably bond without generating mechanical stress. Thus, adhesives can also point the way forward to new interior design concepts.

Sound-damping properties

Modern sound-damping technologies can also be deployed in order to optimize noise and vibration attenuation. Sprayable acoustic materials from Henkel have been found to be particularly effective in such applications because they can be specifically targeted to those areas where sound insulation is most needed. Moreover, their layer thickness can be precisely metered, eliminating costly surplus.

Given these many benefits, the high-tech elevators used in the Shard, including the double-deck cars, were manufactured with extensive use of Henkel technologies. And in hundreds of other public buildings, apartment blocks and railway stations, adhesives have for years continued unobtrusively to bond and hold.

In Europe alone, real estate owners and project clients install around 100,000 elevators in new builds and refurbished premises every year. In the dynamic growth markets of Asia, the figure is much higher. And everywhere, the number of projects in which adhesives with their superior mix of properties are replacing previously established joining technologies is constantly on the rise.

Henkel operates worldwide with leading brands and technologies in three business areas: Laundry & Home Care, Beauty Care and Adhesive Technologies. Founded in 1876, Henkel holds globally leading market positions in both the consumer and industrial businesses with well-known brands such as Persil, Schwarzkopf and Loctite. Henkel employs about 47,000 people and reported sales of 16,510 million euros and adjusted operating profit of 2,335 million euros in fiscal 2012. Henkel’s preferred shares are listed in the German stock index DAX.

Photo material available for downloading at http://www.henkel.com/press.
The following images are available for publication:

Thanks to the advent of advanced adhesives, materials such as glass and metal can be interconnected with ease to generate designs of great interest and appeal.

For many years, adhesives have proven ideal for the fabrication of single- or multi-passenger, load-carrying or goods transport elevators – with the trend still rising.

Henkel’s structural adhesives are also used to bond doorsets.
The use of adhesives alone can reduce car weights by up to 20 percent.

Adhesives are also replacing traditional joining technologies in the electric motors used for elevators.

Henkel's adhesives were also applied in the elevators operating in London's “The Shard.”