Silicones: Sustainability

October 2008

Meeting society's future needs today

Modern society expects technical innovation and product development to improve quality of life and further long-term sustainable development. Silicones help make this possible. Silicones are a versatile family of synthetic products ultimately derived from sand. They are used in a remarkably diverse range of applications from construction to electronic and electrical appliances, medical devices and household products, to name but a few. Prized for their versatility, they make literally millions of products perform better, last longer and be more efficient. Here are some outstanding examples of silicones in action.

Innovative architecture with structural glazing

Structural glazing – the vast expanses of glass that are such a feature of modern architecture – depends on silicone sealants. They also further innovative moves towards more environmentally-sound architecture. A well-known example is the European Commission Berlaymont building, situated in Brussels, Belgium. Twenty-one kilometres of advanced silicone joinery not only bind the glass to the renovated façade but are also integral to the 21,000 computer controlled mobile glass louvers. These help even out temperature within the building by retaining warmth during the winter and protecting against solar heat during the summer.

Reliability for wind turbines

Advanced adhesives made from silicones bind the giant rotor blades of wind turbines. From 100 metres off the ground or the sea, silicone adhesives resist the toughest conditions and extremes of temperature. They reliably keep together materials that used to be difficult to unite.

Keeping barnacles off ships

Barnacles and other sea creatures which build up on the hulls of ships slow vessels down and increase energy consumption. Special silicone slip-off hull coatings do not kill barnacles but prevent them from sticking. This way they provide significant benefits for fuel efficiency and environmental protection.

'Green tyres' for fuel efficiency and road safety

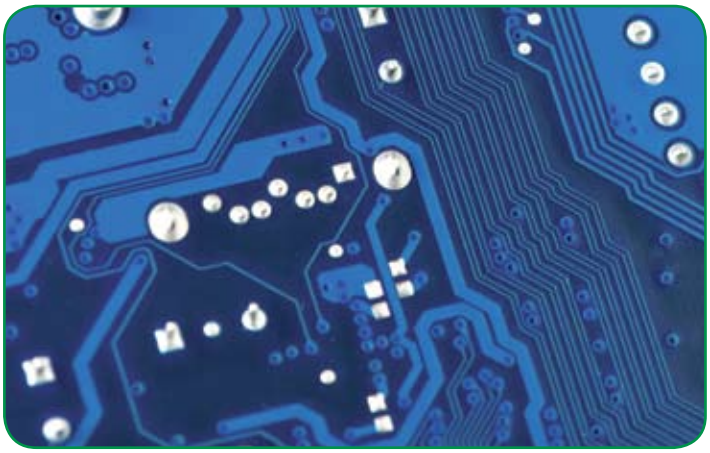
Car manufacturers are constantly trying to improve the environmental performance of road vehicles. Silicone technology has helped produce tyres with reduced rolling resistance, reducing fuel consumption by up to 5%, with a significant lowering in automotive greenhouse gas emissions. They also grip better in wet conditions, reducing stopping distances and improving road safety.

Preserving precious heritage

Sustainability is also about culture. Around the world, silicone coatings are now one of the foremost materials to protect historic monuments against weathering and pollution. They not only prevent decay and corrosion but also penetrate architectural stonework to strengthen it while not undermining any aesthetic aspects.

Safety and reliability for electrical devices

Silicone insulators have become a premium insulator for electrical devices, from the very smallest to the largest, increasing safety, longevity and reducing breakdown. They are used more and more in tiny devices, as the drive to miniaturization continues.



Enhancing energy distribution reliability

Silicone-based insulator coatings protect transmission lines, rendering energy distribution more reliable, minimizing losses and reducing costs for repair and maintenance. They are sprayed onto power transmission lines to eliminate unintended electric discharges and outages sometimes caused by pollution. Particularly helpful for transmission lines along coastal areas (e.g. lines connecting offshore wind power plants to the grid), the silicone coating protects lines exposed to extreme weather elements and a constant salty sea breeze.

Greening paper recycling

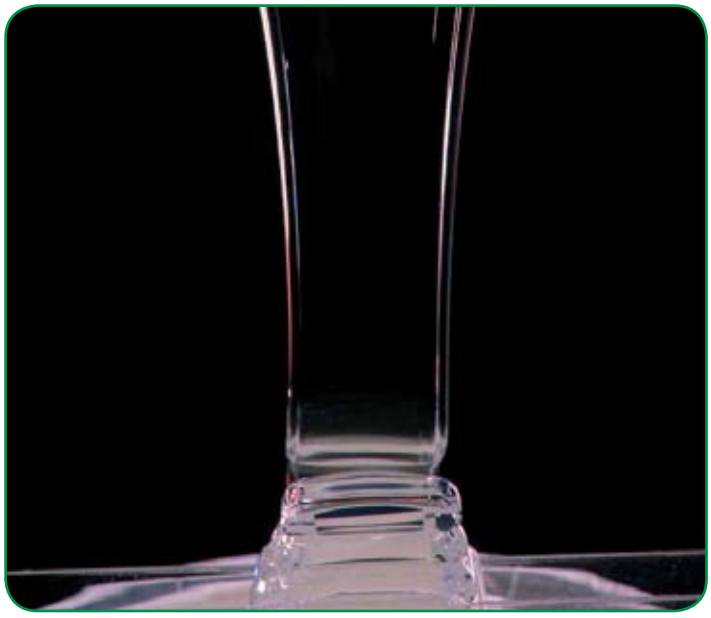
Removing ink from paper (de-inking) is an essential stage of the paper recycling process. Conventional de-inking technologies use caustic chemicals which weaken the paper and require special waste water treatment methods to ensure environmental safety. In contrast, silicone de-inking technology removes these chemicals, leading to improved fibre strength, improved yield and recovery of paper. Less solid waste is sent to landfills, the chemical oxygen demand on the waste water treatment system is reduced and less waste water is produced allowing for better water quality.

Energy-efficient lighting

Ongoing developments in the manufacturing of high power LEDs (Light Emitting Diodes) allows their energy-efficient use be expanded to mainstream lighting, large displays and automotive applications. LED semiconductor chips need to be encapsulated to protect the chip from damage and improve and direct light output. Silicone encapsulants as opposed to conventional encapsulating materials can tolerate the heat emitted by new brighter LEDs. Silicones allow increased use of LEDs in a wider range of applications, enabling significant energy savings and reduced greenhouse gas emissions.

Reducing production waste

During silicon metal production, silica fume (SF) is generated. While historically considered waste, SF is now productively used as a quality and durability enhancer in both the high-performance concrete and refractory industries. By recovering these fumes, the waste stream of the silicone production chain is reduced and resource savings are realised as SF extends the life of materials.



Innovation, competitiveness and sustainability

Silicone manufacturers recognise the importance of sustainability commitments and incorporate them into their corporate social responsibility programs.

All three principles of sustainability - social, economic and environmental - are key to the competitiveness and therefore the survival of a company in the long term. The direct link between innovation, competitiveness and sustainability lies in the increased return of saving resources. With this in mind, companies continue investing in research and development in order to advance innovative solutions that improve not only products but also the production process itself.

Safer buildings

In buildings, structural silicone sealants in protective or impact-resistant windows increase protection for tenants or passers-by in the event of severe weather, fire, seismic activity, explosions or criminal trespass. Silicone glazing systems are used in factory-laminated windows for new construction and in adhesive film for existing windows. These systems reduce the potential for broken glass being blown from its frames resulting therefore in increased safety.

Biocompatibility for medical comfort

Silicones are biocompatible, which makes them ideal for medical uses. They are odourless and tasteless, do not support bacteria growth, are easy to sterilise and excellent for sensitive applications, for example respiratory tubing and topical medications. Most importantly, silicone rubbers do not react with other materials and exhibit superior compatibility with human tissue and body fluids. When used externally or intravenously, they do not generate unwelcome by-products or trigger allergic reactions.