CASE STUDY: DARKOO OPTICS CO., LTD.

Dow and Darkoo Optics Co., Ltd. innovate highly efficient and reliable LED lens modules with advanced optical silicones

The challenge

Darkoo Optics Co., Ltd. has established a worldwide reputation for developing optical lenses that enable and enhance high-performing LED illumination sources. Its cutting-edge designs arise, in part, from its extensive knowledge of cutting-edge optical materials. It was Darkoo’s materials expertise that led the company to specify SILASTIC™ MS-1002 Moldable Silicone when it sought to develop two new lenses for high-bay LED lighting fixtures.

“Many conventional optical materials can deliver uniform distribution of light over a broad area,” explained Danny Xiong, general manager at Darkoo Optics. “However, the high-bay lighting fixtures that we designed our lenses for often illuminate warehouses, industrial settings and outdoor parking lots. That meant our lenses needed to provide much higher performance, reliability and durability under harsher conditions.”

Dow and Darkoo specified optical-grade SILASTIC™ MS-1002 Moldable Silicone for its DK66-S60 (60°) and DK66-S90 (90°) lens designs. This optical-grade transparent silicone delivers very low viscosity before cure, processes at room temperature and requires very low injection pressures compared to thermoplastics. After cure, it exhibits high flexibility to support easy demolding, as well as long-lasting toughness of final optical parts. The excellent processability of SILASTIC™ MS-1002 Moldable Silicone expands design flexibilities for fabrication of complex shapes, micro-scale optical structures, multifunctional parts and even undercuts that are difficult to achieve with organic polymers.

The solution

Collaborating closely with Dow, Darkoo specified optical-grade SILASTIC™ MS-1002 Moldable Silicone for its DK66-S60 (60°) and DK66-S90 (90°) lens designs. This optical-grade transparent silicone delivers very low viscosity before cure, processes at room temperature and requires very low injection pressures compared to thermoplastics. After cure, it exhibits high flexibility to support easy demolding, as well as long-lasting toughness of final optical parts. The excellent processability of SILASTIC™ MS-1002 Moldable Silicone expands design flexibilities for fabrication of complex shapes, micro-scale optical structures, multifunctional parts and even undercuts that are difficult to achieve with organic polymers.

Moldable optical silicones offer transmission rates as high as or higher than competitive materials in both UV and visible spectrums. In addition, moldable optical silicones don’t yellow over time at high temperature/high lumen density.
This allowed Darkoo’s lenses to maintain stable brightness and high-quality illumination – even when exposed to the high temperatures and lumen densities emitted by today’s powerful COB LED light sources. The excellent UV resistance of Dow’s material make Darkoo’s lenses highly reliable candidates for both indoor and outdoor lighting applications.

Optics made with Dow’s high-performance optical silicone deliver outstanding mechanical, thermal and optical performance. The long-term stability of optics based on SILASTIC™ moldable optical silicone elastomers has been proven in accelerated aging tests up to 6,000 hours at 150°C, as well as artificial sunlight (UV-A and -B) combined with heat (65°C).

The success

With Dow’s collaborative expertise and optical-grade silicone, Darkoo successfully developed two high-bay lens designs offering 60° or 90° beam angles. The easily processable material contributed to a more efficient and homogeneous light distribution with very low losses.

Compared to organic materials, such as polycarbonate or acrylic, SILASTIC™ MS-1002 Moldable Silicone delivers higher lumen output and stronger resistance to discoloration or degradation caused by high temperatures, high lumen flux, exposure to ultraviolet light and harsh or polluted environments.

Learn more

We bring more than just an industry-leading portfolio of optics materials. As your dedicated innovation leader, we bring proven process and application expertise, a network of molding and optical experts, a reliable global supply base and world-class customer service.

To find out how Dow can support your lighting applications, visit consumer.dow.com/lighting.