

CASE STUDY: PHILIPS LIGHTING

Dow and Philips Lighting collaborate to change the future of UV purification

The challenge

Equipment manufacturers around the world rely on UV purification systems from Philips Lighting—a global leader in the development, manufacturing and application of lighting solutions—for clean water technologies in everything from coffee machines to air purifiers. These UV purification systems prevent the growth of harmful bacteria and micro-organisms in household appliances containing water reservoirs, as well as in a variety of industrial and medical equipment.

In certain applications, OEMs use traditional UV-C lamps made of glass components, which also contain mercury. However, the Philips Lighting research and development team recognized these larger lamps pose several design and performance challenges in smaller household appliances, meaning manufacturers are having to design the product to fit the lamp.

“We are always speaking with manufacturer partners to ensure we are delivering efficient solutions for water quality and safety to the end-user consumer,” said Merlijn Janssen, system architect at Philips Lighting. “We wanted to create a way for manufacturers to have more design flexibility, while still providing optimal product performance.”

The new Philips UV-C LED Module was developed in response to this challenge. Compared to traditional UV lamps, the much smaller, coin-sized Philips UV-C LED Module enables purification system manufacturers to create designs with fewer constraints.

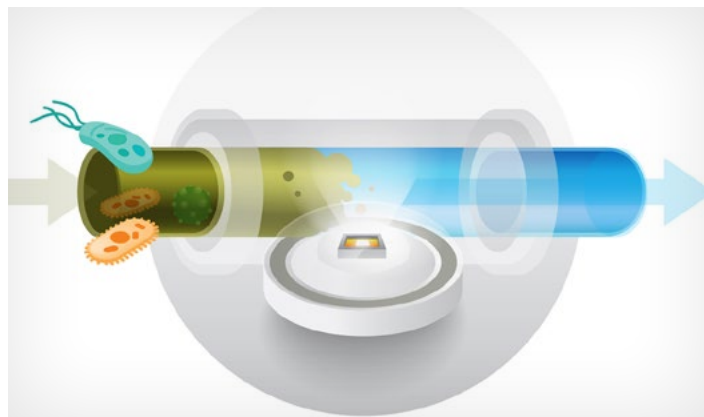
“UV lamps come in all different sizes, even small sizes, but they don’t compare to the module that Philips has now created,” said Janssen. “It can be implemented in many more places that weren’t possible before with the standard UV-C lamps.”

Such innovation did not come easily, however. To effectively transmit the UV-C light into the water or air and safely disinfect, Philips needed to integrate a UV-C transparent optic piece along with a water-tight seal component to protect the interior module electronics from moisture.

The solution

To solve these needs, Philips Lighting turned to Dow, a leading global supplier of silicones and silicon-based solutions, products, technology and services. With Dow’s expertise and wide range of optical grade silicones, Philips Lighting was able to address all challenges through the use of SILASTIC™ MS-1003 Moldable Silicone.

“The [SILASTIC™] MS-1003 Moldable Silicone met all our needs in one solution, where we had anticipated needing two products,” said Janssen. “Having multiple functions in one component means fewer parts, less assembly processes and lower costs.”



“We wanted to create a way for manufacturers to have more design flexibility, while still providing optimal product performance.”

- Merlijn Janssen, system architect at Philips Lighting

SILASTIC™ MS-1003 Moldable Silicone is a medium viscosity, medium Shore A hardness, fast curing optical molding resin.

- Can be molded into complex shapes
- Heat-resistant
- Higher resistance to yellowing than plastic
- Resistant to environmental aging
- Lighter than glass
- Transparent and stable against UV

“Unlike other thermoplastic optics based on hydrocarbon polymer like polymethyl methacrylate (PMMA) or polycarbonate (PC), which are not transparent at all for UV-C, SILASTIC™ MS-1003 Moldable Silicone transmits a high amount of light in UV wavelengths, down to UV-C in the region of 260-280 nm.

This factor, in combination with the silicone’s medium Shore A hardness, made SILASTIC™ MS-1003 Moldable Silicone the perfect fit for Philips Lighting’s UV-C LED Module.

“An alternative material that could have been used for this application is quartz,” said Janssen. “However, optics made of quartz are difficult to produce, especially when the optic design requires tightness against underwater immersion. SILASTIC™ MS-1003 Moldable Silicone allowed us to design an optic with a negative draft angle, which helps push the optic right against the appliance wall, creating a water-tight seal.”

The success

SILASTIC™ MS-1003 Moldable Silicone’s superior flexibility and reliability, compared to quartz or plastics, enabled Philips Lighting to successfully develop the UV-C LED Module, providing end-product manufacturers more design flexibility or even the option to implement the module into existing designs through retrofits.

SILASTIC™ MS-1003 Moldable Silicone’s medium viscosity, good mold flow and excellent consistency ensured a steady and reliable liquid injection molding process so Philips Lighting could have large quantities of high-quality optics produced in an accurate way.

“Dow has been very helpful in providing material samples for evaluation and prototyping, which allowed us to design the silicone without delays,” Janssen said. “We also relied heavily on Dow’s knowledge and expertise in silicone materials physics and chemistry.”



Images courtesy of Philips Lighting

Philips UV-C LED sterilizing module within its SILASTIC™ MS-1003 Silicone molded silicone optic. Half underwater on the right picture.

About moldable silicones

SILASTIC™ moldable optical silicone elastomers are designed to meet the challenging needs of the optical market, including the need for good transmission, moisture resistance and photothermal stability. These two-part, heat-cure moldable silicones are especially suitable for precision molding applications.

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.

SILASTIC™

The information contained herein is offered by Dow and Philips Lighting in good faith and is believed to be accurate.

However, because conditions and methods of use of the products offered by Dow and by Philips Lighting are beyond the control of Dow and Philips Lighting, this information should not be used in substitution for customer’s tests to ensure that the products are safe, effective and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Images: adobe_2708674, dow_43667992450, adobe_2708674

LIMITED WARRANTY INFORMATION – PLEASE READ CAREFULLY

The information contained herein is offered in good faith and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information should not be used in substitution for customer’s tests to ensure that our products are safe, effective and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Dow’s sole warranty is that our products will meet the sales specifications in effect at the time of shipment.

Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted.

TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, DOW SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY.

DOW DISCLAIMS LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

®™ Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

PHILIPS is a registered trademark of Koninklijke Philips N.V.

© 2019 The Dow Chemical Company. All rights reserved.

S2D 91376/E26584

Form No. 11-3847-01 B