

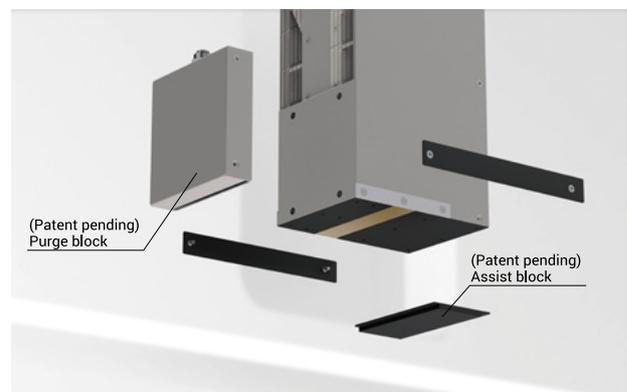
Ingenious UV LED design addresses surface tack

UV curing, a widely employed process across various industries, faces a persistent challenge known as surface tack. Despite achieving bulk curing, surfaces sometimes remain sticky. This is referred to as 'tacky surfaces'. The phenomenon, caused by incomplete curing at the surface, can lead to poor finish quality, smearing, and sticking issues when items are stacked. The culprit behind this inconvenience is the presence of atmospheric oxygen (O_2), which interferes with the polymerization reaction initiated by UV light during the curing process. To mitigate surface tack, the removal of oxygen during UV curing is essential. Implementing an inert and cost-effective gas such as nitrogen (N_2) to clear oxygen above the curing surface presents as a practical solution. However, ensuring an optimal flow of nitrogen, particularly in the vicinity of the UV source and above the curing surface, poses design challenges.

Addressing this concern, Hamamatsu Photonics introduces GH-103A, the brightest air-cooled UV-LED source on the market, emitting an impressive 24 W/cm^2 of UV irradiance at its exit window^[1,2]. While this high output minimizes surface tack, Hamamatsu further enhances the solution with a specially designed N_2 purge block (patent pending)^[3].

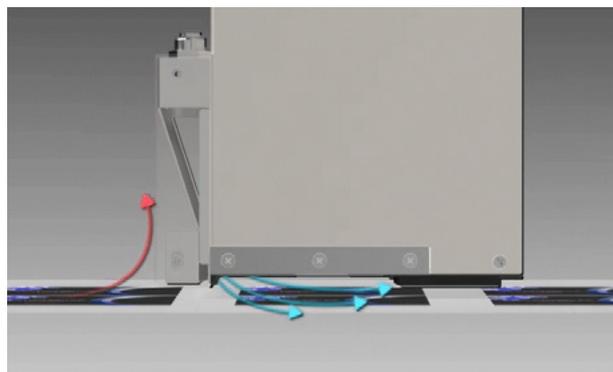
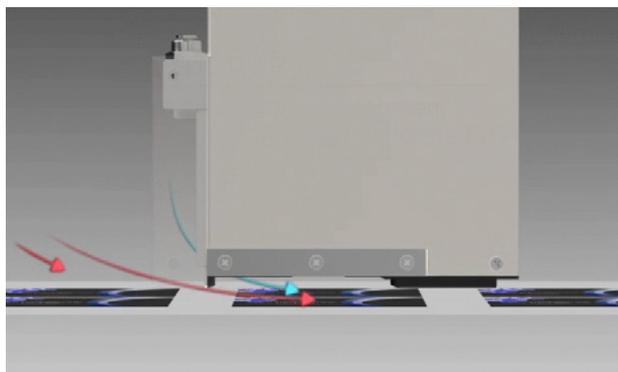
The N_2 purge block seamlessly integrates with the UV LED source, facilitating an optimal flow of nitrogen over the curing surface. Users can effortlessly connect the N_2 supply to the purge block, eliminating the need for complex installation procedures. Complementing the purge block is an assist block, which efficiently reduces nitrogen consumption while ensuring effective displacement of oxygen above the curing surface (see figure 1).

Figure 1: Illustration of GH-103A UV LED with N_2 purge block and assist block attachments.



This innovative solution highlights Hamamatsu Photonics' design philosophy by emphasizing application know-how and user convenience. By offering the GH-103A UV LED alongside the N_2

purge block accessories, Hamamatsu addresses the development and integration burdens for its customers. Additionally, opting for the GH-103A negates the necessity for investing in water-cooling infrastructure or designing N₂ flow optimization accessories.



- Nitrogen
- Oxygen

Figure 2: On the left, an example of how oxygen penetrates the nitrogen purge area during the process of curing printed materials. However, the example on the right shows how accelerating the flow of nitrogen makes it function as an air curtain to prevent unwanted intrusion of oxygen.

The GH-103A UV LED source along with the N₂ purge block meet the requirements of diverse industries, serving applications like curing of inks, resin coatings, adhesives, and encapsulating resins.

In addition to the GH-103A, Hamamatsu Photonics provides a diverse range of UV LEDs tailored to various applications^[4-5], all of which can be customized to meet specific customer requirements. A full video explaining the proprietary nitrogen purging method can be found [here](#)^[3].

For inquiries or assistance with UV curing needs, our dedicated engineers are available at: info@hamamatsu.eu

References

^[1] https://www.hamamatsu.com/jp/en/product/light-and-radiation-sources/uv-led-light-source/uv-led-light-source_linear-irradiation/GH-103A_N2.html

^[2] https://www.hamamatsu.com/eu/en/news/featured-products_and_technologies/2023/brightest-air-cooled-uv-led-on-the-market-with-integrated-N2-purge.html

^[3] https://www.hamamatsu.com/jp/en/product/manufacturing-support-systems/uv-led-light-source/uv-led-light-source_linear-irradiation/hance.html

^[4] https://www.hamamatsu.com/jp/en/product/manufacturing-support-systems/uv-led-light-source/uv-led-light-source_linear-irradiation/uv-led-light-source_linear-irradiation_uv-irradiance_descending-order.html

^[5] https://www.hamamatsu.com/jp/en/product/manufacturing-support-systems/uv-led-light-source/uv-led-light-source_spot-irradiation.html