Adhesive Innovation: Light Cure Cyanoacrylate Technology

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Despite impressive advancements in adhesive technology, manufacturers still face dilemmas when trying to rapidly bond components. Light cure adhesives, which bond in seconds when exposed to light, offer many advantages including unlimited time to align and adjust parts, cure on demand, high strength, and good thermal and environmental resistance. However, most are acrylic formulations that do not cure in shadowed areas or through opaque materials, and the types of substrates they will bond are somewhat limited. Conversely, cyanoacrylates (CAs) or "instant" adhesives, which fixture in seconds and cure completely in hours, offer excellent adhesion to a wide variety of substrates and cure in shadowed areas. However, these adhesives can emit strong vapors, are subject to "blooming" (a white discoloration which occurs during cure), offer limited gap filling capabilities, and cure slowly at surface level, sometimes requiring the use of solvent-borne accelerators or activators.

Light cure cyanoacrylates are a new and revolutionary adhesive technology that was developed in response to demand for an adhesive that offered all the advantages of cyanoacrylates and light cure adhesives, yet none of the limitations. This highly versatile new adhesive technology emits minimal vapors; surface cures immediately when exposed to light, adapts easily into production lines, and requires no second-step accelerators or activators. Light cure cyanoacrylates fixture tack-free in seconds upon exposure to low intensity ultraviolet and/or visible light sources. Any adhesive located in shadowed areas or behind opaque substrates cures naturally and quickly at room temperature due to a secondary moisture cure mechanism.

Light cure CAs are surface insensitive and extremely versatile, offering excellent adhesion to a wide variety of substrates including rubber and plastics. These adhesives minimize blooming and stress cracking on sensitive substrates such as polycarbonate and acrylic. They will also bond polyolefin plastics (polyethylene, polypropylene) when used in conjunction with special adhesion promoters that can either be compounded into the molded parts or applied to the part's surface prior to bonding.

Ideal for high volume bonding applications in almost any industry, the popularity of light cure CAs is rapidly growing for bonding medical devices, cosmetic packaging, speakers, electronic assemblies, small plastic parts, and difficult to bond substrates including rubber and certain plastics. The new adhesive technology offers a wide range of benefits to manufacturers. The rapid cure speed of light cure CAs allow manufacturers to process parts in seconds rather than minutes, often delivering 60 percent of their final strength after only five seconds of exposure to a light source.

Manufacturers should consider using light cure cyanoacrylates for bonding applications involving overlapping non-transparent parts. For such assemblies, the light cure process provides an instant, surface-level bond of the adhesive fillet located just outside the parts, while the secondary moisture cure takes over to complete the bond in shadowed areas. Light cure CAs are also a solution for assemblies where aesthetics are a concern, such as medical assemblies and cosmetic packaging where the white frosted appearance caused by cyanoacrylate blooming affects the clean appearance of the product. By using light curing cyanoacrylates, manufacturers can avoid the environmental issues often associated with solvent-borne accelerators that are commonly used to deliver the fast, tack-free surface cures of conventional cyanoacrylates. Also, light cure CAs can frequently provide the only real solution for difficult to bond substrates.

While today's current light cure cyanoacrylate technology is versatile enough to work in a wide variety of applications, further development of the technology will soon result in a broader selection of viscosities, greater peel and impact resistance, and enhanced thermal capabilities to meet the challenging demands of tomorrow's manufacturing requirements.

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