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The rapid development of LED technology aims to reduce lifecycle cost, provide long-lasting light units, eliminate disposal cost of fluorescent lamps, and reduce weight

01. Coined optics offer lower power consumption than typical LED systems, and give out brighter, more uniform light



LED point source light creates challenges for traditional designs, which produce limited surface area illumination and harsh bright spots that must be diffused using a thick plastic lens.

Michael A Cherock, founder of Powerhouse Design Architects and Engineers of Pittsburgh, Pennsylvania, quoted in the *Pittsburgh Post Gazette*: “The downside of LED lighting is light quality. LEDs have a bluish cast that does not allow an accurate view of colours. The emitter appears as though the moon rather than the sun is the lighting source.”

Vision Engineering’s optical coining technology creates excellent uniformity, which can illuminate a target area without using diffusers. Coined optics evenly distribute light emitted from LEDs to reach the targeted surface, resulting in lower power consumption and higher illumination. Optical coining uses fewer LEDs, while projecting more light that mimics sunlight and eliminates hotspots on surfaces.

“We’re making it easier and more affordable for LED solution developers to get the light where they want it, and need it, without optical engineers and designers,” states Henry Avila, CEO of Vision Engineering. “We match our unique optical design capabilities with Luxeon LEDs to deliver quality results.”

Coining is a well-known process in the forging industry, whereby 3D shapes can be cold-formed to exacting tolerances that maintain their shape and angulations’ integrity, even after forming. To achieve a highly efficient reflective finish, the coined surfaces are vacuum metalised or bright dipped. Applying this technique to lighting where multiple geometric surfaces can be created to control the distribution of the light, gives uniform illumination.

Combining facets to produce the best light levels and uniformity are subject to the target area needed to be



illuminated and the fixture placement in relation to the target area. A radius facet will allow more light to spread in the smallest facet size and is a good choice for creating uniformity. Linear facets are especially useful when a smaller spread of light is desired. The parabolic facet is used to concentrate light in a more focused area to increase light intensity in an area that would otherwise be noticeably darker.

Coined optics give the advantages of LEDs without the harsh lighting or heat dissipation concerns common to emitters. Using malleable metals, such as aluminium, brass or copper, the coined optic is mounted directly to the circuit board and conducts heat away from the board and provides dissipation of the heat generated by the emitter. Maximum heat flux is conducted away from the circuit board by the fixture and disbursed by radiation or convection to the ambient air, resulting in brighter illumination and longer LED life. The cooler the LED is kept, the greater the efficiency rises and average life increases.

Fabricating using coined metal fixtures can be done at a fraction of the cost of the most common method used today, which is a moulded plastic optic.

Plastic optic costs can vary from US\$0.50 cents to US\$1 when small-to-medium runs are made. The cost of a coined optic is less than US\$0.10 cents when small-to-medium runs are made.

Outstanding performance and economy leads the way in Vision Engineering’s development of low-cost efficient lighting solutions for today’s modern applications. Vision’s lighting products’ superior performance has led to its rapid development across a wide array of business, creating lighting solutions for commercial, industrial, residential, entertainment and transportation markets.

LED lighting systems for aircraft applications using optical coining technology produce ceiling lights that project light beyond the aircraft centreline, even for complex curvatures. Achieving uniformity in sidewall lights due to close proximity to the target surface is challenging when using standard LED reflective and refractive concepts. Coined optics splash the sidewall with uniform illumination that mimics natural sunlight. ☒

Contact: info@rare-solutions.com
Web: www.rare-solutions.com