IT'S MORE THAN LIGHTING

DR ARUN JAURA
European Advisory Committee,
SAE International, USA

Automotive lighting has transformed radically over time – powered by acetylene or oil-fuelled lamps (late 1880s) to electric headlights (1904), sealed beams (1939), halogen lamps (1962), High Intensity Discharge (early 2000), LEDs in 2004, and the laser beam headlights in 2013.

Regulations, both operational and safety, have changed considerably and as always consumers have been ever demanding. The regulations requiring headlamps to be on during low-visibility weather, had generated research in the areas of low-beam headlights, daytime running lights (DRLs), or fog lights, and dirt build up. Emphasis on glare, pedestrian safety and street lighting, high speed expressway driving were other influencers in change of regulations and innovative lighting solutions.

During the switch from sealed beams to HID, the technological evolution examined the stopping distances under different headlamp illumination conditions and concluded that HID had a greater mean stopping distance than halogen headlamps. HID also offered higher luminous efficacies to achieve brighter forwards light.

ADVENT OF LED & OTHER TECHNOLOGIES

In 2004, LED lighting systems became a natural progression. From an exterior styling standpoint, LEDs offer uniqueness to the looks and branding opportunities for OEMs. LEDs are less susceptible to vibration than filament lamps and offer optical design flexibility. LEDs consume approximately 85 % less energy, and last nearly ten times longer than incandescent bulbs. They generate much less heat thus allowing for smaller, thinner packaging and improved installation and styling options for inner ambient lighting too. Interestingly, the industry also switched to LEDs on construction and repair trucks, since these were a lesser drain on the vehicle battery and are also energy-efficient.

Today, some OEMs in the high luxury segment have switched to lasers. The laser units are 30 % more efficient than LEDs, and can illuminate up to double the distance (about 2 km). Lasers are used for high beams as they are not as focused as LED lights, while LEDs are used for low beams.

ROLE OF MATERIALS

Materials have been another major enabler in changing the face of automotive lighting. Outer lenses for automotive headlights are predominantly formed from polycarbonate resin, and also increasingly to form inner lenses. This resin has excellent thermal stability, impact strength, clarity, heat resistance and ease of injection moulding for complex lens designs. There are several new grades of polycarbonates that help OEMs to become more creative with their styling and branding.

Innovative ambient lighting in the cabin is another influencer, while deciding to buy a vehicle. Ambient lighting creates an ergonomic environment that is more relaxing for the occupants, provides a perception of extra value and a safer feel. With car-pooling becoming more popular, each occupant is seeking privacy and separate personal light to be able to work or read in the vehicle. Another aspect of car sharing in a home is that the vehicle is driven by multiple drivers in the same home. Each one desires different intensities and prefers unique display colours on the instrument panel. Homogenous lighting with accurate dimming and providing excellent visual comfort is a primary need of the driver in any case.

CONCLUSION

Energy management and reduction of CO_2 are overarching drivers, besides safety and legislation, and need to be holistically implemented during the development and choice of automotive lighting systems. The integration of multitude of gizmos makes it prudent to manage energy and battery size in the vehicle. The standard 52 Amp-hr battery is stretched too far in a conventional vehicle and soon 84 Amp-hr may become a standard feature.

Today its more than just automotive lighting – it's stitched together with the underlying attributes of affordability, reliability and longevity that are the trident of innovative sustainable mobility.

Read this article on
www.autotechreview.com