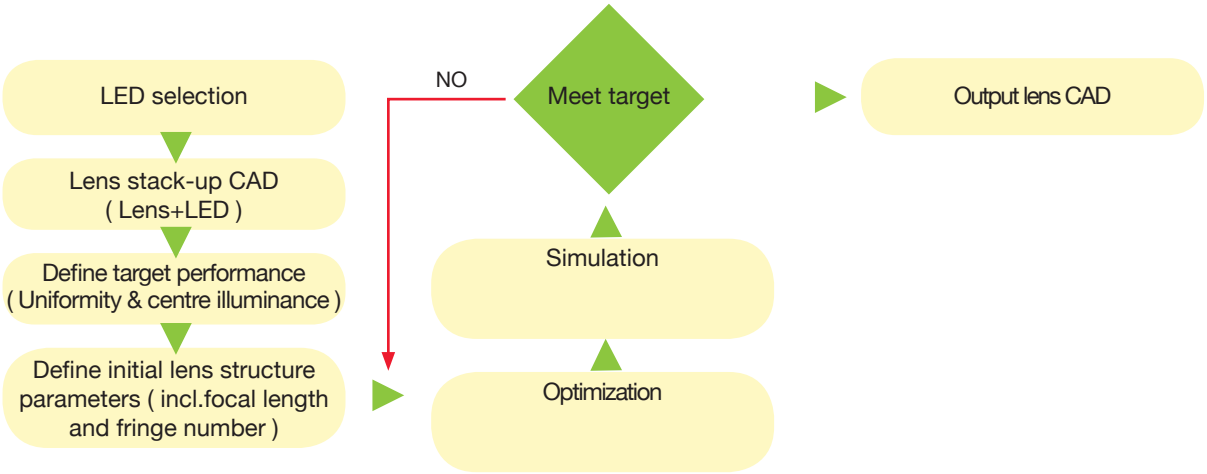
# PRECISION OPTICAL COMPONENTS

Your partner in expert turnkey illumination solutions and non-imaging optical applications

## Lenses for LED Illumination

Unisteel offers a variety of customized lenses to suit customers' optical applications and requirements. From flash lenses in mobile phones to LED lighting solutions in automotives, all our lenses are fully developed in-house, to exacting customers' specifications and requirements.

## Design Guideline




| Lens Types | Description |
|---|---|
| **Fresnel lens** | With its thin and lightweight design, Fresnel lens is suitable for compact modules, and unlike the conventional spherical lens, it has a flat plane with short focal length and large aperture; making Fresnel lens the ideal candidate for flash lens applications.<br><br>Depending on customers' requirements, Unisteel offers Fresnel lens in single, duo and racetrack configurations. |
| **Total internal reflection (TIR) lens** | TIR lens ensures uniform brightness with no risk of light scattering by collimating the light from the source and sending a concentrated beam of light out in the same direction. Unlike traditional reflectors, which use reflective coatings, TIR has the potential to reach 100% reflectivity.<br><br>The key advantage of TIR lens lies in its high efficiency in light collection and delivery. If space is not a critical factor, TIR provides an ideal alternative for flash lens applications. |
| **Aspheric lens** | Ideal for use in imaging and non-imaging optical systems, aspheric lens has a special non-spherical surface to converge central and peripheral light rays at a single focal point perfectly. Small and lightweight, coupled with its ability to correct spherical aberration and other optical aberrations makes aspheric lens an ideal replacement for a complex multi-lens system. |
| **Free form lens** | Ideal for use in customized illumination application, free form lens has a free form surface that has non-symmetrical geometry which not only enables the projection of non-conventional illumination but also provides a better solution than multi-component classic lens systems in focusing LED light with very low losses. |
| **Conventional spherical lens** | One of the most common lenses used in optical systems design, spherical lens is made with a particular radius of curvature, either on one or both surfaces. Depending on the desired flash patterns, spherical lens is available in plano-convex, bi-convex, meniscus, plano-concave and bi-concave cuts. |

## Light Guide

Made of either acrylic or polycarbonate, light guide/ pipe is the perfect solution for channeling light down a clear plastic from the source to the destination and offers cost savings in energy consumption. Suitable even in systems where lighting needs to be routed around existing components, it is designed to enable inward reflection of light as it moves throughout the entire area of the design, resulting in a uniformly lit appearance.

The performance of a light guide/pipe is dependent on the efficient application of Total Internal Reflection (TIR). At Unisteel, we offer optical design support to optimize light transmission efficiency. Using the best optical grade of acrylic or polycarbonate plastic for maximum clarity, combined with best-in-class in-house tooling process, you can trust Unisteel to deliver light guide/pipe solutions of exceptional performance.

### Applications

- Logo generation
- Backlight solutions for keypads and displays
- Other customized lighting solutions

## Material Selection

Here at Unisteel, we support a wide range of materials and can help customers in selecting the ideal materials to get the most out of your products. With the use of plastics for precision optics increasingly prevalent in today's optical markets, customers are also opting for lighter and tougher materials for their optical components. Apart from optical properties such as clarity and refractive index, other properties such as abrasion resistance, impact strength and flexural modulus are equally important factors for consideration.