01 Part One
Company Profile
HercuLux Optics

• **Background**: With the registered capital of 20.18 million RMB, Chengdu HICREAT PHOTOELECTRIC Co., Ltd is established by experts from Institute of Optics & Electronics, Chinese Academy of Sciences with more than ten years of experiences in optical science, precision optical mold and precision optical injection mold. The company is devoted to provide the most innovative secondary light distribution programs and relevant optical components to the field of LED lighting.

• **Main Business**: Optical Energy Design and Devices

• **Application**: Indoor light: Shopping mall, Hotel, Office, Home and so on; Outdoor lighting: Street lamp, spot light and so on; Auto LED Head light, LED TV backlight, Stage lamp and UV optical so on
02 Part Two
Core Technology
What we Did?

Technical Evolution
Innovative technical solutions & concepts

Technology + Product

Product Development
Optimize the product by following the Technical Evolution
Developed innovative super high order free-form surface street lamp lens to overturn the traditional “Peanut” design.

Calculus lens Anti-glare Technology solved the glare issue of LED indoor light, especially for the COB application.

Self-adaption glue technology, Breakthrough the theoretical limit that lens efficiency can not exceed 92%, Achieved nearly 100% luminous efficiency.

Designed special lens for integrated packaging LED, enhanced the luminous efficiency more than 14%.

Based on Calculus anti-glare technology, developed imitated-COB lens, solve color fixing issue and lower system cost dramatically.

Ultrathin backlight interface reflect against technology, save space by same LED, cut LED by same space.

Aim at hotel lighting, we innovate secondary optical optimization for the lens shade of LED light. It effectively control the light and ensure facula uniformity. Greatly improved the optical quality.

Triple-Reflect calculus technology developed on original calculus anti-glare technology, lower the lens height dramatically.

Be a backstage hero, help customer to get huge success in business and brand effect by innovative technical solutions & concepts.
Successful Story

Street lamp in 23 Maio Av, Sao Paolo, Brazil, with HercuLux Lens

Tunnel Light in Changi Airport project in Singapore, with HercuLux Lens

Street lamp in Sao Paulo University in Brazil, with HercuLux Lens

Retrofit Lighting project in Jaen Spain, With HercuLux Lens
Successful Story

Shanghai-Hongqiao Airport Project in China, With HercuLux Lens

Street lights project in Turkey, with HercuLux Lens

Tennis Court in Australia, with HercuLux Lens

High Bay Lights in Germany, with HercuLux Lens
Successful Story

Spot Light Project in Mumbai India, HercuLux Optics light up the India TATA Group-The Imperial Club
<table>
<thead>
<tr>
<th>Four Technology Platforms</th>
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</thead>
<tbody>
<tr>
<td><strong>Optical technology</strong></td>
</tr>
<tr>
<td>• Independent developed high-order free-form surface optical design software and unique optical design and development concepts</td>
</tr>
<tr>
<td><strong>Precision injection processing technology</strong></td>
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<tr>
<td>• Control technology for the precision optical injection process</td>
</tr>
<tr>
<td><strong>Precision optical mould technology</strong></td>
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<tr>
<td>• Mould design and production technology based on free-form surface, mould compensation technology, ultra-precise processing technology</td>
</tr>
<tr>
<td><strong>Adaptive glue technology</strong></td>
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<tr>
<td>• Zero air spacing technology based on adaptive colloid formula</td>
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The 4 platforms are fundamental guarantee for HICREAT to rival its competitors in the field of LED light distribution products.
Difference of Imitators

- Misalignment of the center of sub-facula; the color of illumination field
- Inconsistent scale design; failed to conform to the homocentric principle, dazzling;
Design Principle

1. Make segmentation differential process for the wave surface of several scale light sources. In this way, the light source will be cut into several sub-light sources. (differential calculus for light source);

2. Each sub-light source forms sub-facula on the light field. The centers coincide with each other, rotate and overlay (differential calculus of light field) and form a lighting field with uniform color;

3. The light received by each scale would be consistent or with uniform change. In this way, the glaring surface of lens would have the same brightness and prevent dazzling;
Calculus Anti-Glare Technology - Diamond and Comet

Application

Track light

PAR Light
• Triple-Reflect technology is a great innovation based on Calculus technology, greatly reduced the lens height compare with the original calculus lens, let the light reflect three times inside the lens, make sure get good light distribution with lower height lens.

• Graphic 1 is a fully reflecting surface and a optical emitting surface, light from graphic 3(LED) fully reflected to graphic 2(included angle) by the surface 1, then totally reflect two times in the included angle, at last all lights emit out from surface 1 by total three times reflection.
The reflect surfaces of included angle 2 are all fully reflecting surface, control the lens angle by adjust the surface shape.
**Triple-Reflect Technology - sunflowers**

- **Application**
  - MR16, GU10, PAR Light, Track Light and so on

  Triple-Reflect technology also follow the calculus technology design principle
Application

- Application

MR16

GU10

PAR Light

Track Light and so on
**Design Principle:** Photon Lens designed by one refracting surface and several fully reflecting surfaces, can control the light distribution well by lower lens height.
Why can make the light distribution well by lower lens height?

1. Area 1 is refracting surface, control the light from the middle of the LED, to control the small beam angle;
2. Area 2 are fully reflecting surfaces, little far away from the COB, control some long lights to be small beam angle;
3. Area 3 are periphery fully reflecting surfaces, control the outermost lights also the best lights, can make smaller beam angle and make a clear edge light spot;

The multi-level reflect technology separate the lights to be 3 areas, and control every part light very well by different best technology, to make sure get a clear edge light spot even lower lens height!
**50@14 Series**

### 50@14 -12°

- **Part Number**: HK-50@14-12-1310-20-1g-1
- **D*H(mm) & material**: 50*14 & optical polycarbonate
- **K**: 13 for 1310
- **LED**: cree-1310, cree-1304
  - Or LES=Ø6mm

### 50@14-24°

- **Part Number**: HK-50@14-24-1310-20-1g-1
- **D*H(mm) & material**: 50*14 & optical polycarbonate
- **K**: 4.8 for 1310
- **LED**: cree-1310, cree-1304
  - Or LES=Ø6mm
50@14 Series

50@14-36°

Part Number: HK-50@14-36-1310-20-1g-1

D*H(mm) & material: 50*14 & optical polycarbonate

K = 3 for 1310

Spot Diagram

LED: cree-1310, cree-1304, Or LES=Ø6mm
### 75@21 Series

<table>
<thead>
<tr>
<th>Part Number</th>
<th>D*H(mm) &amp; Material</th>
<th>K = 12 for 1507</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>HK-75@21-12-1520-20-1g-1</td>
<td>75°21 &amp; optical polycarbonate</td>
<td></td>
<td>cree-1507&lt;br&gt;Cree-1512&lt;br&gt;Cree-1520&lt;br&gt;Or LES=09mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part Number</th>
<th>D*H(mm) &amp; Material</th>
<th>K = 5 for 1507</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>HK-75@21-24-1520-20-1g-1</td>
<td>75°21 &amp; optical polycarbonate</td>
<td></td>
<td>cree-1507&lt;br&gt;Cree-1512&lt;br&gt;Cree-1520&lt;br&gt;Or LES=09mm</td>
</tr>
</tbody>
</table>
75@21 Series

Part Number: HK-75@21-36-1520-20-1g-1

D*H(mm)& material: 75*21 & optical polycarbonate

K=2.5 for 1507

Spot Diagram

LED: cree-1507, Cree-1512, Cree-1520, or LES=Ø9mm
90@22 Series

**90@22 series-12°**

- **Part Number**: HK-90@22-12-1820-20-1g-1
- **D*H(mm) & material**: 90*22 & optical polycarbonate
- **K=13 for 1820**

**90@22 series-24°**

- **Part Number**: HK-90@22-24-1820-20-1g-1
- **D*H(mm) & material**: 90*22 & optical polycarbonate
- **K=6 for 1820**

**LED**
- cree-1820
cree-1830
bridgelux-v18
cxm-11
Or LES=Ø12mm

**Spot Diagram**
<table>
<thead>
<tr>
<th>90@22 series-36°</th>
<th>Part Number</th>
<th>( D^*H(\text{mm}) ) &amp; material</th>
<th>( K=3 ) for 1820</th>
<th>Spot Diagram</th>
<th>LED</th>
</tr>
</thead>
</table>
| HK-90@22-36-1820-20-1g-1 | 90*22 & optical polycarbonate | | | | Cree-1820
| | | | | | Cree-1830
| | | | | | Bridgelux-V13
| | | | | | Or LES=Ø9mm
Photon
More than thin!
Degree from 15° - 36°
Diameter from 35mm - 90mm
Thickness from 9.5mm - 23.2mm
More angle, more size, give you more choice and freedom!
1. Basic concepts

- When lights pass by a surface with differentiated refractive index, they will be reflected by the surface.

If $n_1=1\text{(air)}$, $n_2=1.5\text{(optical materials)}$

$$R_1 = R_2 = \left(\frac{n_1-n_2}{n_1+n_2}\right)^2 = \left(\frac{1-1.5}{1+1.5}\right)^2 \approx 4\%$$

$$R_1 + R_2 \approx 8\%$$
2. Realization Principles

Adaptive glue technology - Turbine
3、Advantages

• Illuminating efficiency: 8% higher; 8% cost down; energy saving 8%;
  $8\% + 8\% > 16\%$

• You could add phosphor powder in the colloid; you could realize light output with low color temperature by using LED light source with high color temperature; you could even adjust color temperature.
  (undoubtedly with several advantages)
4、Test Report

5、Application

Mainly in Street Lamp/Tunnel Light/Spot Light

- Lens efficiency > 99% ;
- $U_L > 0.75$, $U_0 > 0.45$ ;
- Geometry utilization ratio > 67 % ;
- Deflected angle technology , Small Angle to install ;
- Seriation lens to meet the needs of different sections
<table>
<thead>
<tr>
<th>Patent (Application) No.</th>
<th>Name of Invention</th>
<th>Date of Application</th>
</tr>
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<tbody>
<tr>
<td>201020622420.0</td>
<td>Lens for light distribution of LED lighting facilities &amp; lamps</td>
<td>Nov 24, 2010</td>
</tr>
<tr>
<td>201020622396.0</td>
<td>Dazzling prevention reflection bowl for LED lamps</td>
<td>Nov 24, 2010</td>
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<tr>
<td>201120223136.0</td>
<td>A LED lamp with high glaring efficiency</td>
<td>June 29, 2011</td>
</tr>
<tr>
<td>201120495188.3</td>
<td>Light distribution lens for LED lamps</td>
<td>Dec 2, 2011</td>
</tr>
<tr>
<td>201120101269.0</td>
<td>A LED lamp</td>
<td>Apr 8, 2011</td>
</tr>
<tr>
<td>201220179018.9</td>
<td>Calculus light distribution lens for LED lamps</td>
<td>Apr 25, 2012</td>
</tr>
<tr>
<td>201220395257.8</td>
<td>A light distribution lens for LED lamps</td>
<td>Aug 10, 2012</td>
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<tr>
<td>201220395684.6</td>
<td>A LED light distribution lampshade &amp; LED lamp</td>
<td>Aug 10, 2012</td>
</tr>
<tr>
<td>201220395497.8</td>
<td>A LED light distribution lampshade &amp; LED lamp</td>
<td>Aug 10, 2012</td>
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<tr>
<td>201210283946.4</td>
<td>A lampshade &amp; LED lamps using this lampshade</td>
<td>Aug 10, 2012</td>
</tr>
<tr>
<td>201220395625.9</td>
<td>A lampshade &amp; LED lamps using this lampshade</td>
<td>Aug 10, 2012</td>
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</table>
So far, we have obtained more than 120 patents, including 6 core patents. Applying for two PTC (international patents).

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<th>Patent (Application) No.</th>
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<tbody>
<tr>
<td>201210304023.2</td>
<td>Lens for LED stage lamps &amp; LED stage lamps</td>
<td>Aug 24, 2012</td>
</tr>
<tr>
<td>201220423275.2</td>
<td>Lens group for LED stage lamps &amp; LED stage lamps</td>
<td>Aug 24, 2012</td>
</tr>
<tr>
<td>201220433071.7</td>
<td>A uniform face light source device for exposure machine</td>
<td>Aug 29, 2012</td>
</tr>
<tr>
<td>201210314333.2</td>
<td>Lens for light distribution of LED lamps &amp; lamps</td>
<td>Aug 30, 2012</td>
</tr>
<tr>
<td>201220436312.3</td>
<td>Lens for light distribution of LED lamps &amp; lamps</td>
<td>Aug 30, 2012</td>
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<tr>
<td>201210317492.8</td>
<td>Auxiliary device and methods for realizing uniform exposure on the two surfaces of a PCB board</td>
<td>Aug 31, 2012</td>
</tr>
<tr>
<td>201220439942.6</td>
<td>An auxiliary device for realizing uniform exposure on the two surfaces of a PCB board</td>
<td>Aug 31, 2012</td>
</tr>
<tr>
<td>201230413539.1</td>
<td>Lens for stage lamps</td>
<td>Aug 30, 2012</td>
</tr>
<tr>
<td>201230413605.5</td>
<td>Lens</td>
<td>Aug 30, 2012</td>
</tr>
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</table>
Part Three

Product Series
Part Four
R&D Capacity
R&D Capacity

Technology Strength
The main research and development strength by photoelectric institute of Chinese academy of sciences, 4 senior engineers, 2 masters and 12 bachelors.

Independent Software
To get a best design, even we developed a special light design software based on Zemax and a mold compensation software.

Optical Design
Use Zemax data input design but not 3D software design first and use Light tools or Tracpro to test and then adjust, can get more sophisticated high-order free-form surface.

Structural Design
Good structural design ability can finish PCBA/Waterproof/thermal dissipation structural but not only lens design.

Mold Design
Mold team have over 20 years experience, make mold more sophisticated/high efficiency and simple, with high precision machine.

Quick response for Design: Optical design → Structural design → Optical simulation → Mold assess → Injection molding analysis
R&D Team

- GM
- Engineer manager
- Tech center

R&D 1
- Optical
- Structure
- Mold Testing

R&D 2 (Mold)
- Mold design
- Mold making
- Mold assembly

Test center

- Optical engineer: 8
- Structure: 3
- Mold testing: 3
QC

Based on ISO9001 QC system; Based on different product PPAP confirm system; Professional QC worker and Advanced precision equipment, In handing the client to ensure that each batch of products are accord with a standard to ask.
Part Eight
Industrial Park, Honor
THANK YOU!

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