Luminit®
Automotive Technologies

DVN Shanghai 2019

Three Dimension Free Form Automotive Rear Combination Light Functional Lens incorporate Holographically-Recorded Microstructures

Stanley Kao
President & CEO






- A new and innovative recording and transfer technique allows these highly efficient microstructures to be used on a free-form 3D surface, which is ideal for automotive rear light lens design and manufacturing.

- The final form factor of a monolithic large format three-dimensional free-form lens is compatible with rear light lens assembly design and conforms to all automotive standards.

- Discussion on how holographically-recorded microstructures and its optical characteristics are maintained on non-flat surfaces.

Luminit LLC Announces Joint Venture with RiT Display for Next-Gen Automotive Optics

Taiwan-based Luminit Automotive Technologies will develop and manufacture optical solutions for automotive taillights and next-generation light sources for LiDAR and HUD applications.

TORRANCE, CA – January 18, 2019, Luminit LLC, a privately-held high technology company specializing in thin-film optics, will embark on a joint venture with RiT Display, a Ritek Group Company, to provide lighting and driver assistance solutions for US-, Europe- and Asia-based automakers. The newly-formed JV, Luminit Automotive Technologies (LAT), will develop and produce curved injection molded diffusers for automotive taillights, as well as diffusers for LiDAR and HUD applications.

"Luminit is a leader in microstructure mastering and the Ritek team are experts in the field of microstructure fabrication," notes Luminit Automotive Technology's President and CEO, Stanley Kao. "Combining both areas of expertise with the global logistics that Ritek will make LAT a major player in automotive lighting and driver assistance technologies."

https://www.luminitco.com/about/press

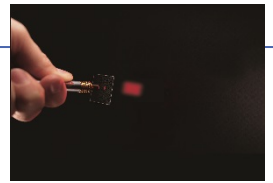
Luminit's Background

Founded in 2006, Luminit is a global leader of innovative light management solutions for the lighting, display, automotive, aerospace, biomedical, and machine vision industries. Our core expertise includes:

- **Holographic recording**
- **Micro and Nano surface relief replication**
- **ISO 9001:2015 certified**
- **ISO/TS 16949 – LAT certification pending**





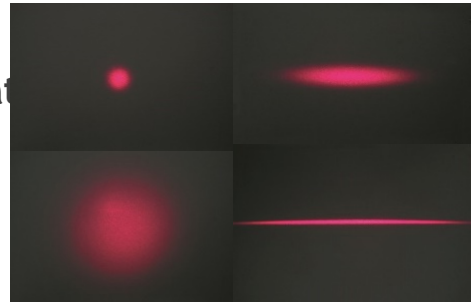
Luminit diffusion technology is based on a very thin microstructure on top of the clearest substrates available. The transmission efficiency of our thin film and thick rigid diffusers are practically equivalent!

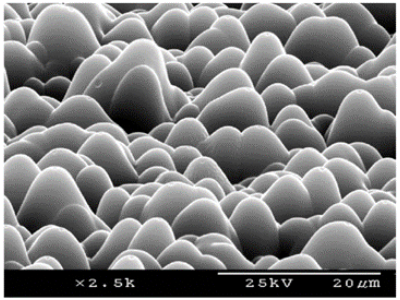
Surface Relief Pattern

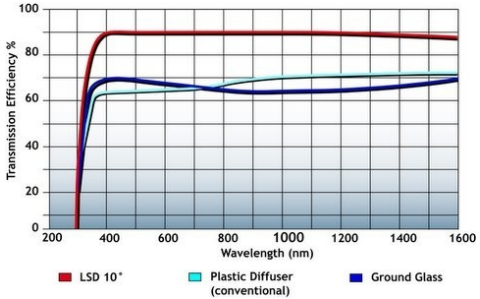
Optical performance is independent of thickness of substrat

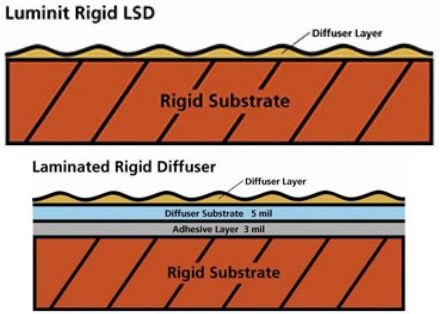
Directly applied to substrate without adhesive

Uniform optical performance over all wavelengths/colors





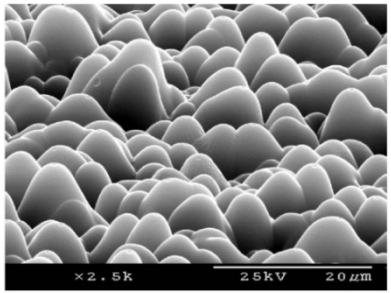


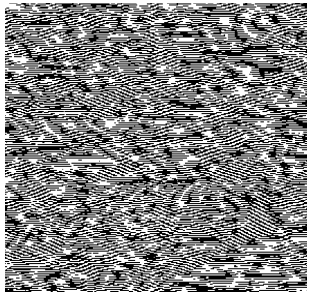


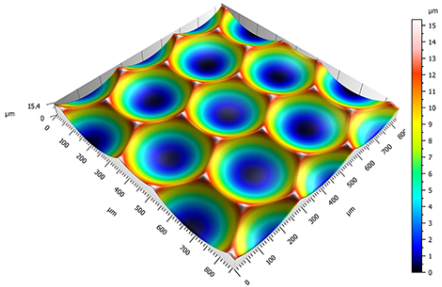
Light Management

Luminit Holographic Technologies include:

- Light Shaping Diffusers®, prismatics and other microstructures
- Computer Generated Holograms (CGHs)
- Light Shaping Microoptics (LSM)
  - Wide grayscale capabilities







Taillights

Daytime running Lights

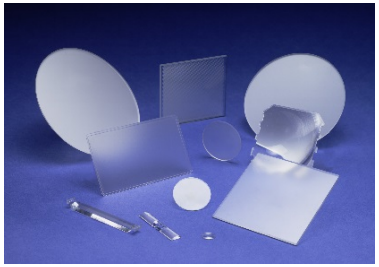
Heads-up Displays

LiDAR

Dashboard Clusters

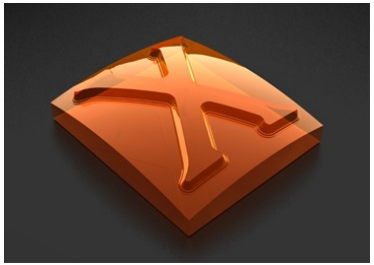
Interior Lighting

Formats



Injection Molded LSD® Lenses

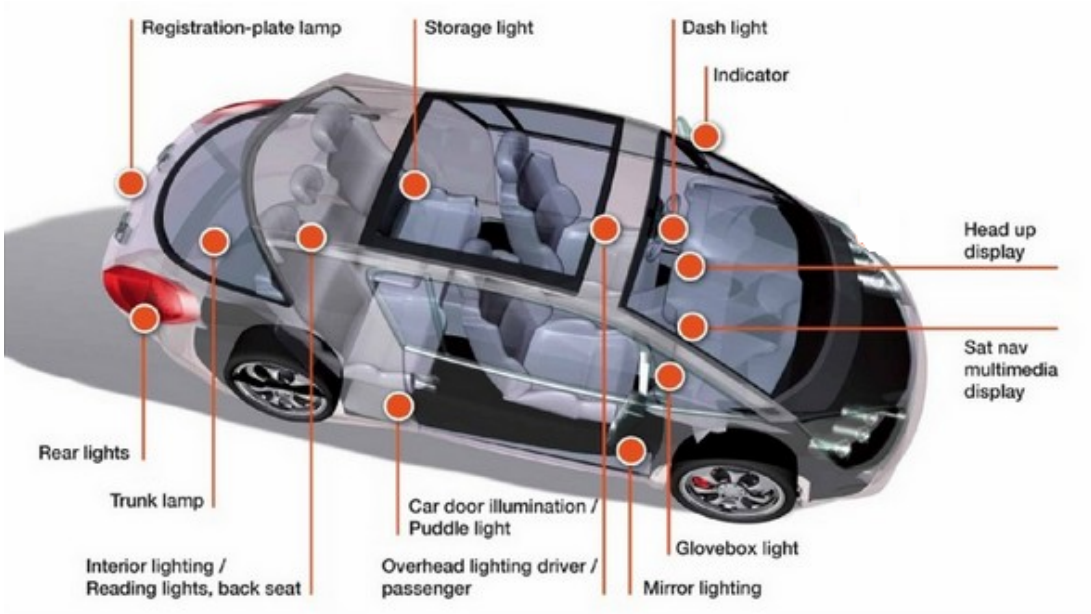
Roll-to-Roll Flexible Film



2.5 D and 3 D
Curved Injection Molded

Molded Optics

Luminit's Key Applications in LED Automotive Lighting



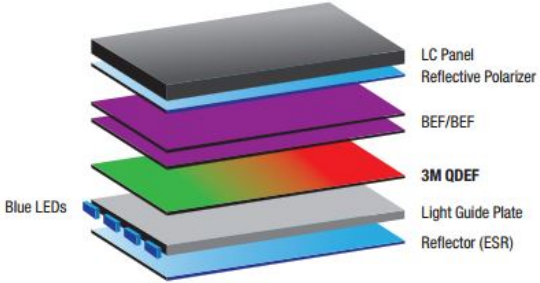
Rear Lights

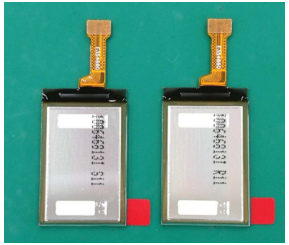
Forward Lights

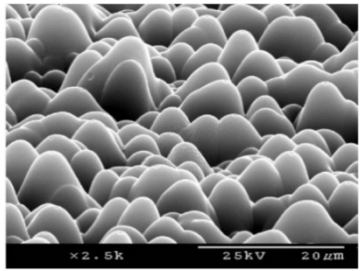
CHMSL

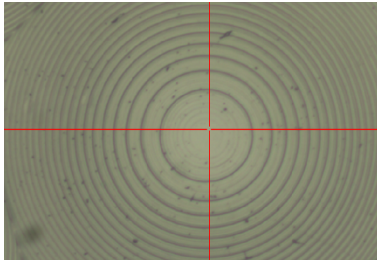
LiDAR

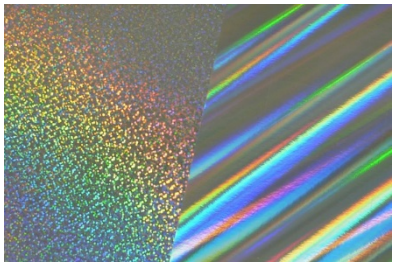
Light Guide Stack Solutions











AMECA Approved

Approved by AMECA as meeting the three-year weathering test of SAE J576 for plastics used in optical lenses and reflectors used on motor vehicles.

http://ameca.org/list-of-acceptable-plastics/
http://ameca.org/wp-content/uploads/2018/02/AMECA-List-of-Acceptable-Plastics-for-Optical-Lenses-and-Reflex-Reflectors-February-9-2018.pdf

2.5D and 3D Curved Injection Molded (CIM) Lenses

No Diffuser

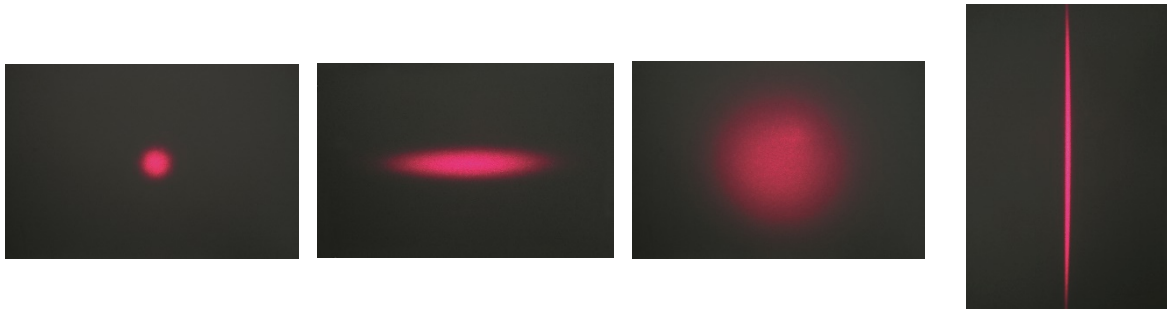
60 ° x 1° Diffuser

1° x 60° Diffuser

100° Diffuser

3D Light Shaping Diffuser Capabilities

- Customized diffuser patterns (circular and elliptical) on 3D shape
- Robust mastering process
- Modeling capability to calculate precise target angle for any shape



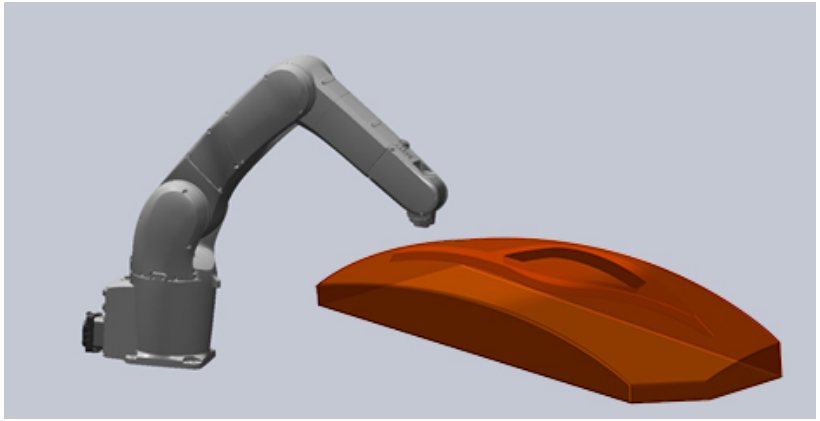
3D Light Shaping Diffuser Capabilities - Modeling

- Developed a transfer function to extrapolate diffusion angles from 2D to 3D
- New replication method has been developed to measure LSD angle for 3D shape
  - Used for both flat and curved surfaces
  - Able to replicate 2D, 2.5D and 3 dimensional shapes

3D Light Shaping Diffuser Capabilities – Recording

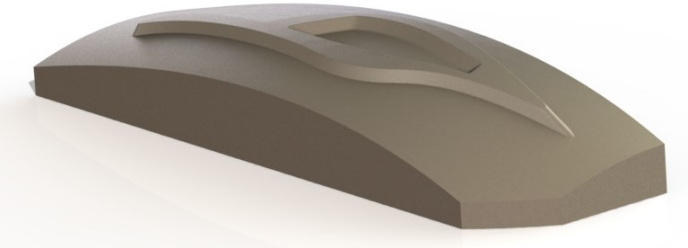
- Automated mastering process with excellent control over the diffuser structure
- Multiple axes to achieve 3D surface of custom shape
- Process control for smooth exposure

Achievable on surfaces with tight radii and narrow widths



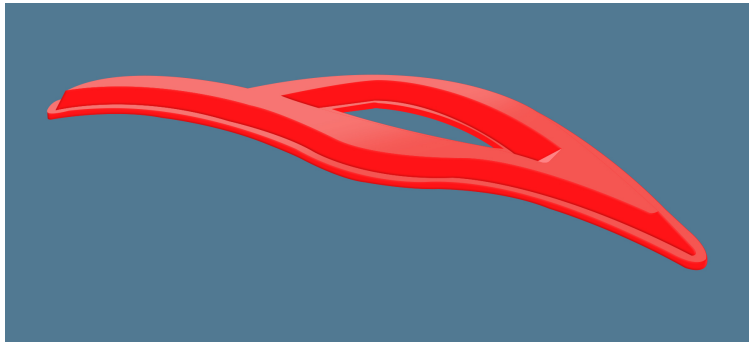
3D Light Shaping Diffuser Capabilities – Ni Shim Creation

- Vertically Integrated Manufacturing
- In-house Ni electroforming process with good reproducibility
- Excellent process control to achieve Ni thickness uniformity
- Controlled mechanical strength optimized for creation of Ni shim for 3D shape.



3D Light Shaping Diffuser Capabilities – Injection Molding

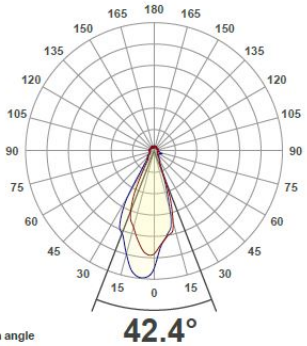
3D light shaping diffusers with bright and uniform illumination



Luminit
SHAPING LIGHT AS NEEDED

Light efficiency:
15 Lumen/Watt
Light quality:
CRI: 0
Color temperature:
0 K

Output: 13.5 lm
Peak: 15.9 cd
Power: 0.91 W
PF: 0.39
12 PLANES



Beam angle
42.4°

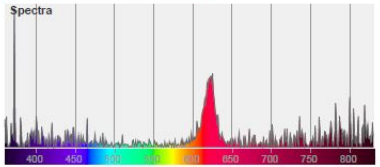
Product name:
Honda Tail Light Demo - Test 6

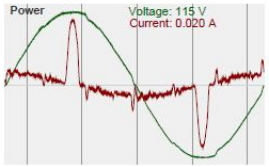
Date and time:
3/5/2019 9:59:34 AM

Additional information:
Light Stack:
LEDs

Note: Redo of Test 1 with 12 planes

Color
CIE1931
x: 0.490
y: 0.271



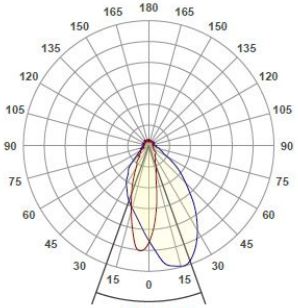


Light Stack LEDs

Luminit
SHAPING LIGHT AS NEEDED

Light efficiency:
6 Lumen/Watt
Light quality:
CRI: 0
Color temperature:
0 K

Output: 5.34 lm
Peak: 4.88 cd
Power: 0.90 W
PF: 0.39
12 PLANES



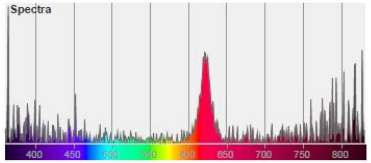
Beam angle
39.5°

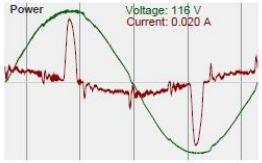
Product name:
Honda Tail Light Demo - Test 5

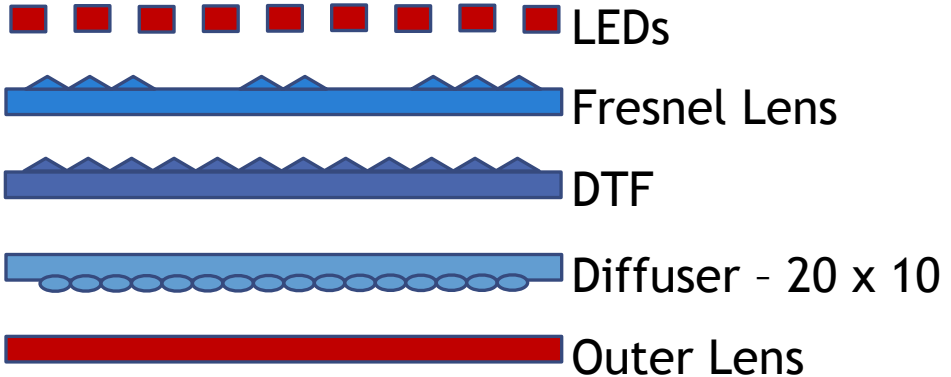
Date and time:
3/4/2019 4:23:40 PM

Additional information:
Light Stack:
LEDs
Fresnel Lens
DTF
Diffuser
Outer Lens

Color
CIE1931
x: 0.479
y: 0.270







Thank you for your time!

sales@luminitautotech.com