



**광기구 설계를 위한
Simulator LightTools®**

Modern HighTech Co., Ltd
OPTICAL RESEARCH ASSOCIATES

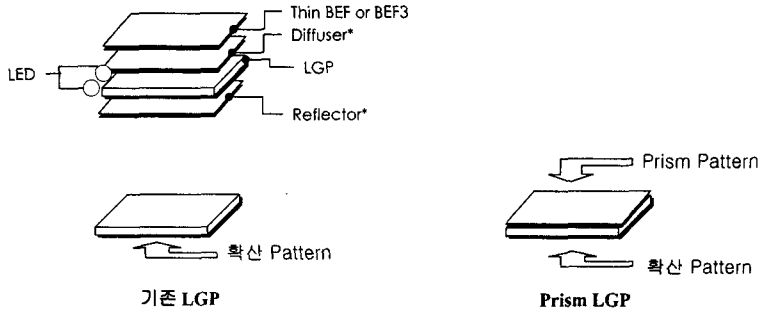
02-2108-5900
codev@okmodern.com

What is the LightTools® ?

- 제작사 : Optical Research Associates
- 1965년에 설립
- CODE V 와 LightTools 프로그램 판매
- Optical Consulting 업무
- 구성 : Core , Illumination, Imaging Path,
Data Exchange (IGES, SAT, STEP, CATIA)
- 금형제작 전 Simulation 을 통해 경향 및 특성을 파악
- 제작 단가 및 시행착오를 줄일 수 있음.

실제 모델과의 비교

측정방법



- BM7를 이용하여 수직 50cm거리에서 휘도 측정

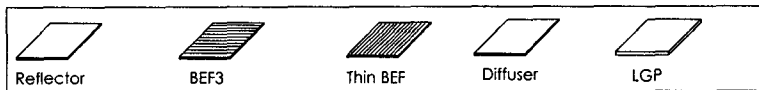
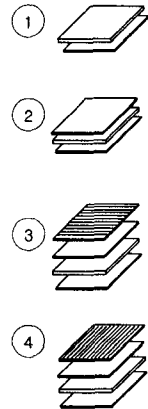
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과기부 설계용 워킹 Simulator LightTools Slide 3

기존 LGP

기존 LGP

Po.	#1	#2	#3	#4
1	267.6	630.9	1699	1875
2	268.7	620.3	1675	1813
3	251.3	614.5	1648	1794
4	184.4	498.3	1416	1578
5	198.9	508.5	1422	1581
6	195	500.3	1400	1533
7	159.4	474.7	1353	1619
8	144.1	462	1374	1637
9	142.9	443	1348	1575
Lum.	201.36667	528.05556	1481.6667	1667.2222
Uni.	53.18	70.22	79.34	81.76

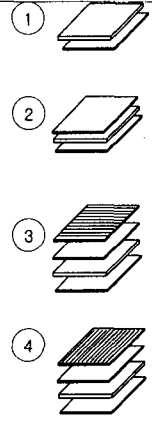


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과기부 설계용 워킹 Simulator LightTools Slide 4

Vertical Prism LGP

Po.	#1	#2	#3	#4
1	624.3	946.6	1777	1913
2	679	996.4	1834	2018
3	604.7	867.9	1583	1752
4	659.6	1019	1814	2122
5	746	1113	1921	2265
6	705.2	1032	1737	2043
7	601.7	977.6	1735	2136
8	621.4	997.3	1729	2220
9	619.3	956.5	1601	2052
Lum.	651.24444	989.58889	1747.8889	2057.8889
Uni.	80.66	77.98	82.4	77.35



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공기군 평가를 위한 Simulator LightTools Slide 5

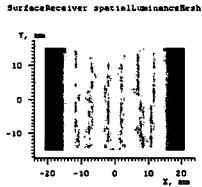
Vertical Prism LGP Image



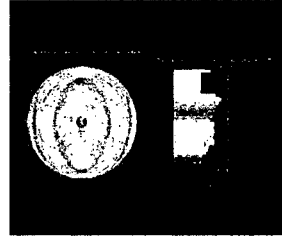
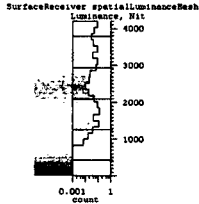
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공기군 평가를 위한 Simulator LightTools Slide 6

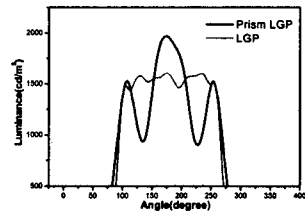
Vertical Prism LGP Simulation



Luminance



Viewing Angle

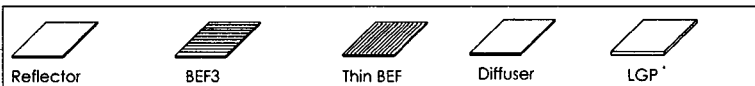
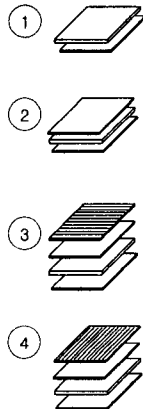


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Horizontal Prism LGP

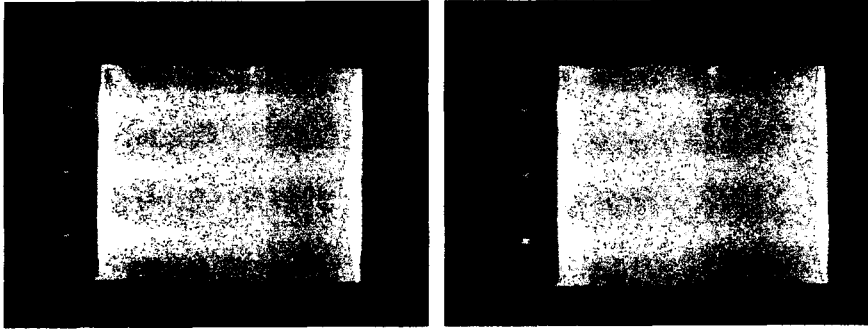
Prism LGP				
Po.	#1	#2	#3	#4
1	549.2	472.6	783.7	693.4
2	546.5	490.6	781.6	692.6
3	452.8	426.9	757.2	674.7
4	1036	891.9	1428	1172
5	981	878.5	1416	1170
6	919	786	1333	1101
7	3279	3605	4030	5042
8	2796	3303	4308	5018
9	2784	3078	3664	4571
Lum.	1482.6111	1548.0556	2055.7222	2237.1889
Uni.	13.81	11.84	17.58	13.38



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과기부 지원을 위한 Simulator LightTools Slide 8

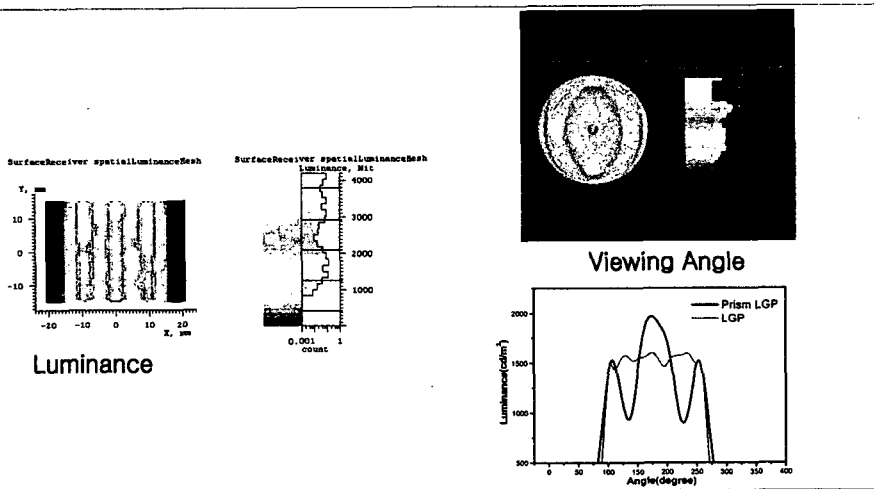
Horizontal Prism LGP Image




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Horizontal Prism LGP Simulation

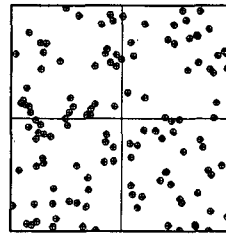
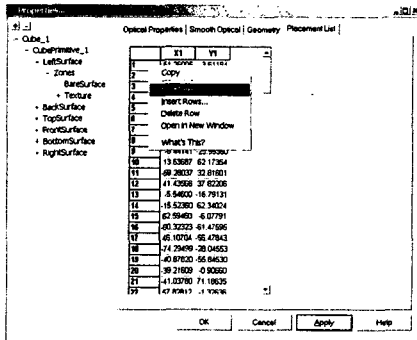



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Patterns In LightTools

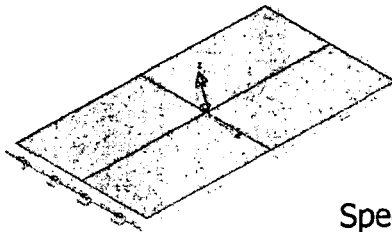
- LightTools 고유의 Pattern 정렬 방식
- Pattern Generator 에서 생성한 Pattern 의 X, Y 좌표값을 그대로 입력 가능
- Excel 또는 Word Pad 에서도 Pattern의 좌표 값을 설정 가능



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BLU Simulation Result (1)

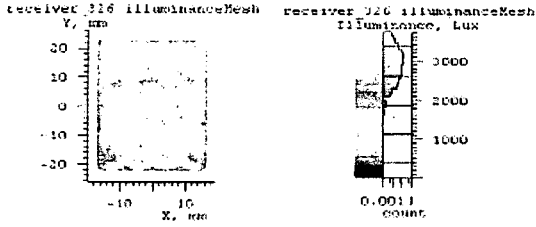


Spec. : 3M Prism Sheet 2 장
(45° Crossed BEFs)
신화인터텍 Diffuser Sheet
(Transmittance 92 %, Haze : 30 %)

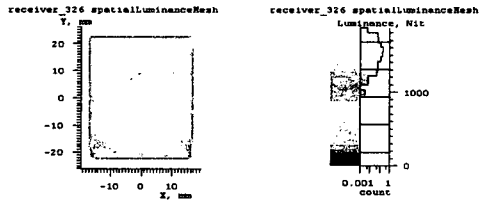
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Simulation Result (2)



Illuminance chart



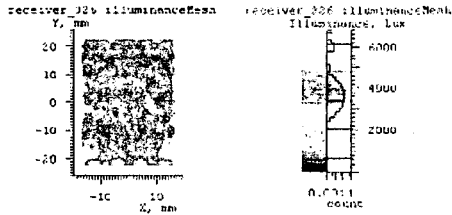
Luminance chart



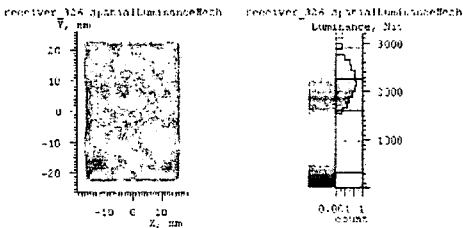
과기부 성과물 관리 Simulator LightTools Slide 13

Simulation Result (3)

Condition : Without Diffuser



Illuminance chart



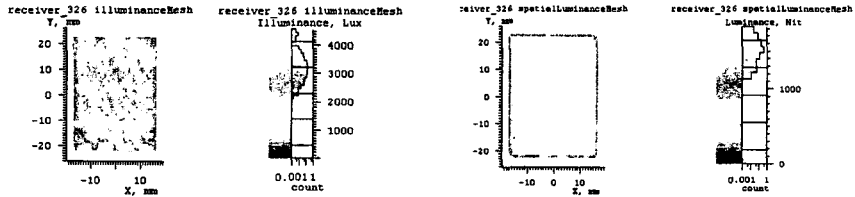
Luminance chart



과기부 성과물 관리 Simulator LightTools Slide 14

Simulation Result (4)

Condition : Diffuser sheet 변경
Transmittance 92% Haze 40%



Illuminance chart

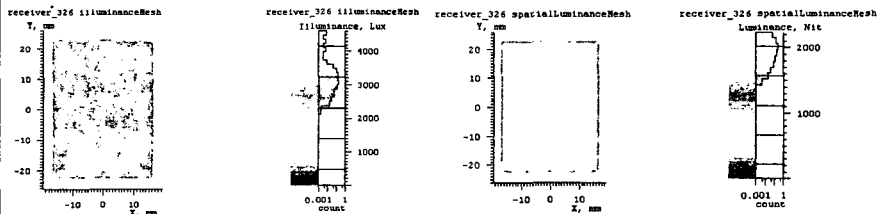
Luminance chart

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Simulation Result (5)

Condition : Beads Type 1M / mm, R = 1,000 nm, n = 1.6,
Base material : PMMA



Illuminance chart

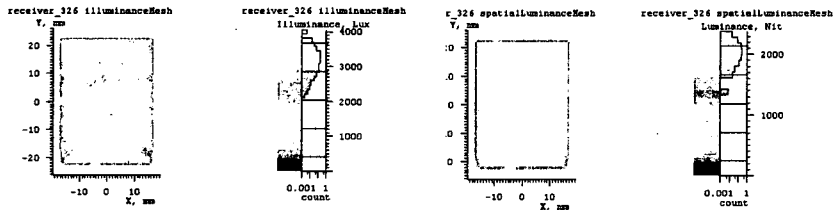
Luminance chart

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Simulation Result (6)

Condition : Beads Type 1M / mm, R = 500 nm, n=1.6,
Base material : PMMA



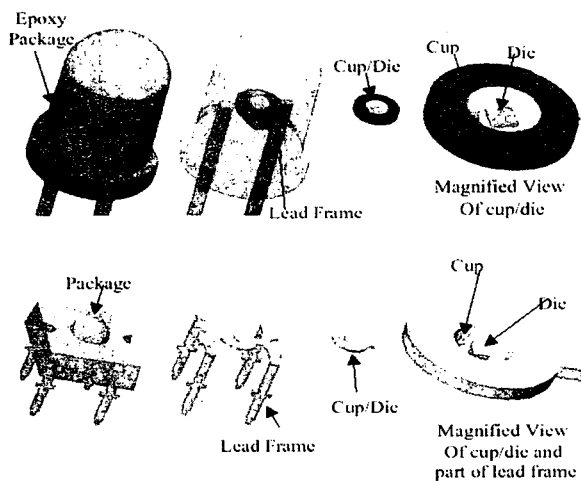
Illuminance chart

Luminance chart



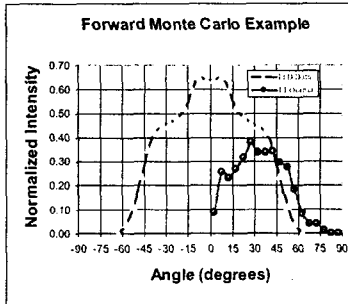
과거그 선계를 위한 Simulator LightTools Slide 17

LED Design In LightTools

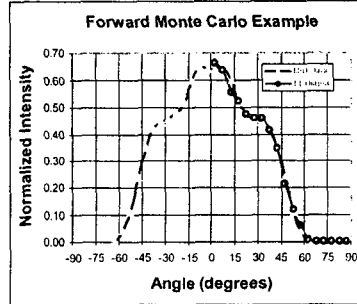


과거그 선계를 위한 Simulator LightTools Slide 18

Optimization (최적화)



Starting and Target Intensity Distributor



Final and Target Intensity Distributor

Optimization can 'FIND' a match with relatively poor starting conditions.

Typically vary lens radius and conic constant, die/cup position, cup taper Angle, and ratio of flux etc.



과기부 지원을 위한 Simulator LightTools Slide 19

Source Library

Source Library

⇒ Over 500 different sources

LED Apodization Sources

- || Agilent LED's
- || LumiLeds LED's
- || Nichia LED's
- || OSRAM LED's

Model Number	Apodization Model	Manufacturer	Application
HPWT-T1000	HPWT-T100	Lumileds	Sign and Backlight
HPWT-F1000	HPWT-F100	Lumileds	General
HPWS-T1000	HPWS-T100	Lumileds	Backlight
HPWS-F1000	HPWS-F100	Lumileds	Backlight



과기부 지원을 위한 Simulator LightTools Slide 20