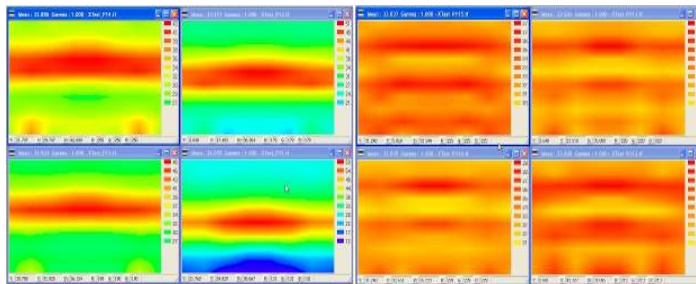


## ExFRACTOR™ Flux Extractors for Planar Lightguide Panels (LGP).

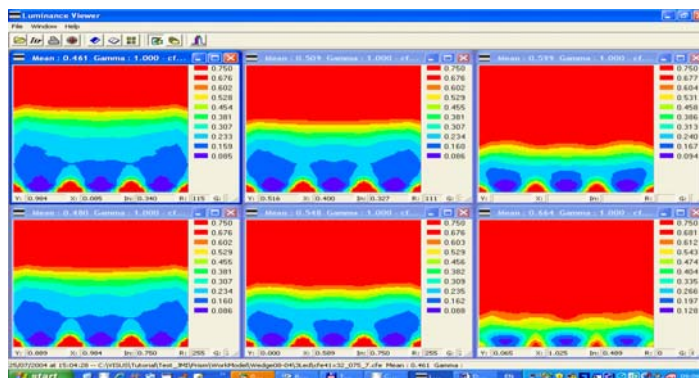
Uniform flux extraction is a core problem of all edge-coupled backlight systems. In order to produce a uniform luminance Extractor density and/or shape should generally have a complex 2-D Distributions. Less known is a fact that there is a infinite number of solutions for any particular system. Indeed with a very low extractor density one can produce an even luminance already with a uniform density. However a resulting luminance would be low, as there are elevated flux losses caused by longer travel passes of photons inside a lightguide and reflection on side reflectors.

Our patented have a unique energy conservation property: light is extracted at a shortest possible distance from light sources. In this way a maximal luminance is ensured.

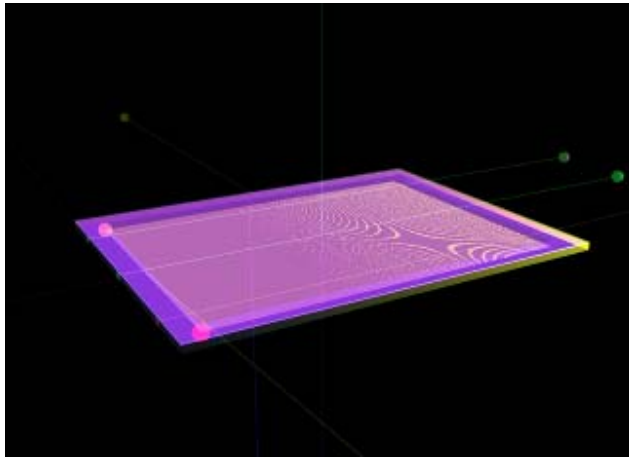
Our unique KEREN™ CAD/CAM Software Package for non-imaging optics enables a fully automatical design of optimal ExFRACTOR™ features in a series of gracefully converging iterations for any extractor shape: dot, spherical & CPC lenses, prismatic & cylindrical grooves etc. The resulting pattern is then antialiased (randomized) and postprocessed for immediate production of stamper for mold cavities, chemical & laser etching, EB lithography etc.



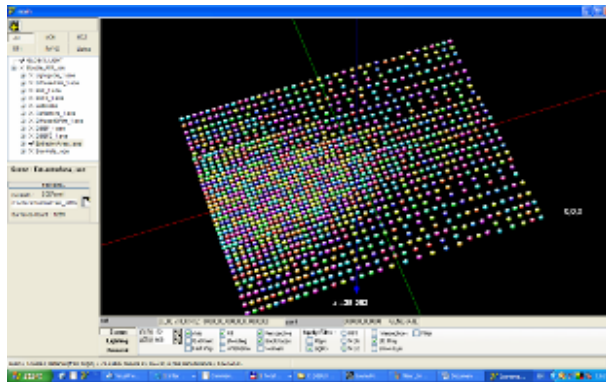
**Figure 1 LUMINANCE DISTRIBUTION AT INITIAL AND FINAL ITERATIONS. NONUNIFORMITY IS IMPROVED FROM 5:1 TO BETTER THAN 1.1:1**



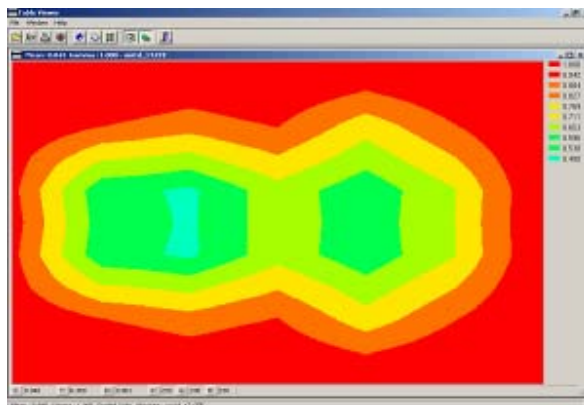
**Figure 2 CORRESPONDING EXTRACTOR DISTRIBUTION DURING ITERATIONS.**



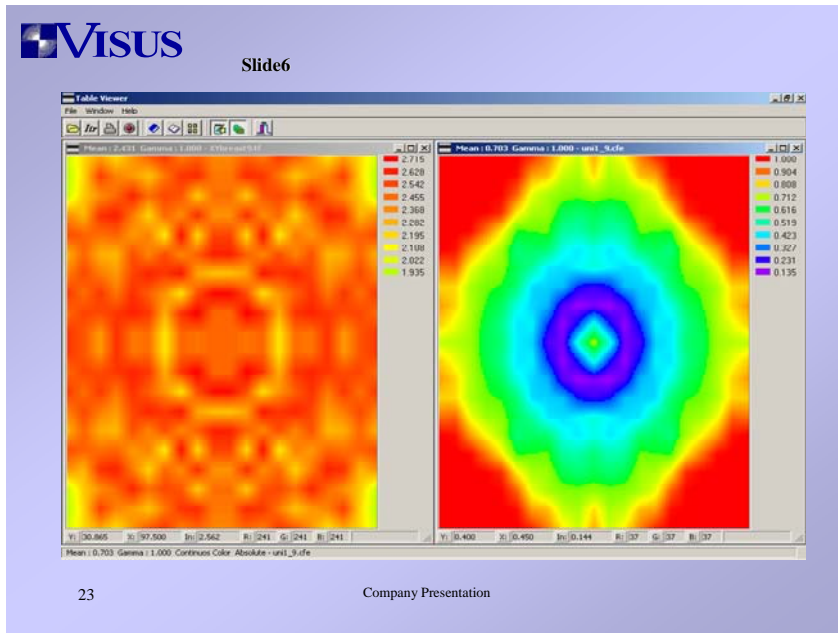
**Figure 3 Fully assembled 2.2" BLU with discontinuous V-Groove extractors.**



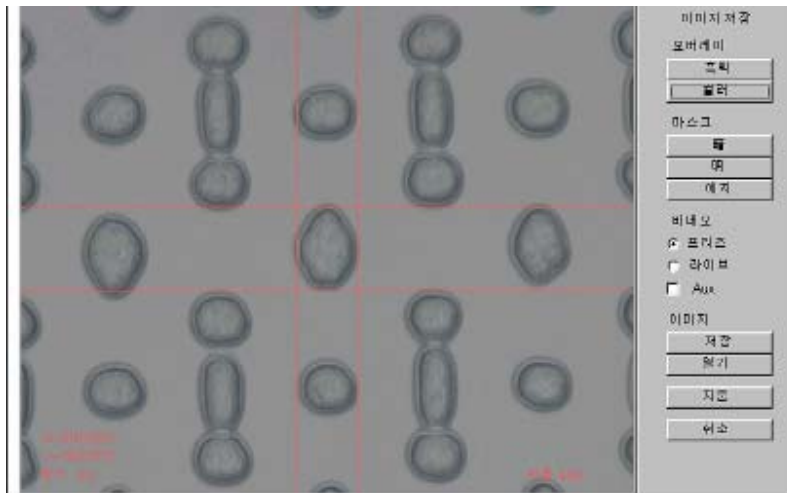
**Figure 4 LGP with non-uniformly distributed simple spherical extractors. Actual extractor size: 20-50 um.**



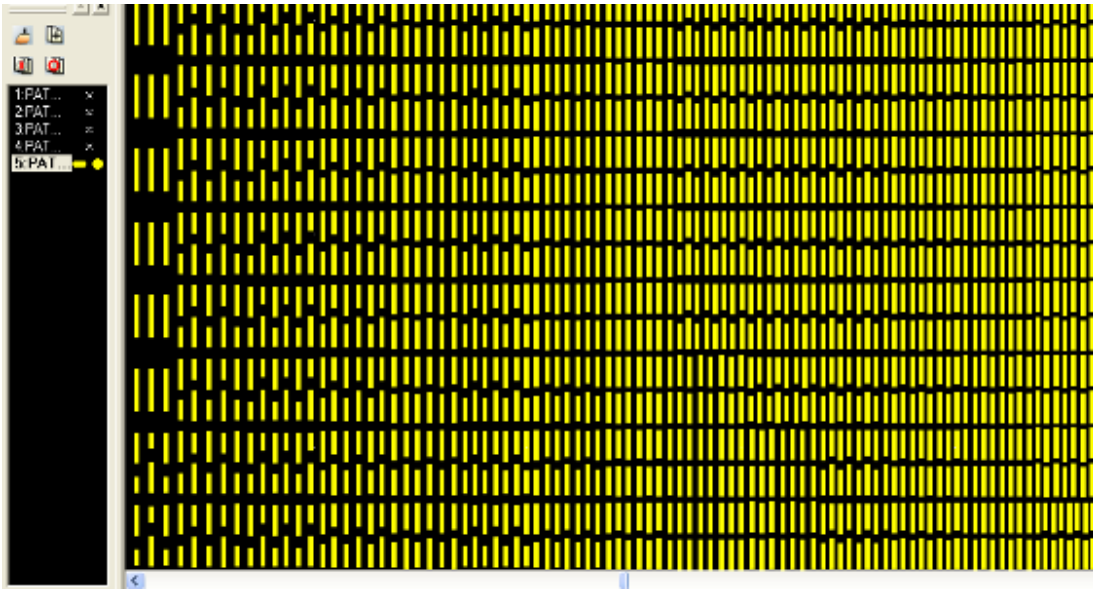
**Figure 5. Example of Extractor distribution for ultra-thin microdisplay backlight. Notice a unique irregular pattern, which is very different from usual monotonically changing distributions.**



**Figure 6. Face-coupled Backlight. Complex 2-D flux Extractor Distributions (right) Producing Uniform Luminance (left).**



**Figure 7. Stamper with complex 50um spherical and V-Groove lenses.**



**Figure 8. Magnified fragment of 50um V-Groove pattern.**