Printed lenses

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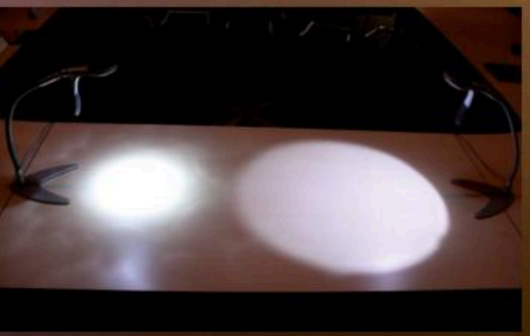
It sounds like a futuristic novel, but it is actually already reality: on 1. March this year Luxexcel, a company based in Goes/NL produced the first optical accessories for LEDs using a modified digital printer. The invention of this new technology was rated as important enough to warrant inviting Karla Peijs, Queen's Commissioner for the province of Zeeland, to be present at the very first print-out.

A wide range of optical lenses, such as Fresnel and linear lenses, can be designed and produced using Printoptical Technology.



New Printoptical Technology applied for the first time in an LED fixture from RZB Leuchten.

The innovative combination of techniques applied in the fields of digital printing, optical technology and lighting engineering has led to the development of a brand new system, which goes by the name of "Printoptical Technology" and offers previously unimaginable opportunities for producing optical structures, lenses and prisms by printing them on a variety of backing materials.

And it really is as simple as it sounds. Special software calculates the design of an optical lens according to the specifications determined by the light source and the desired lighting technology. This data is forwarded to the printer, which prints out the lens as it would in any other graphic printing process. The patented, digital printing process is principally the same as that of a standardised printer, the only difference being that it is not ink that is being printed on paper but transparent or tinted polymer, onto another polymeric or similar backing material. The droplets, which are applied at a resolution of 1400 pixels, are hardened using UV radiation so they remain firmly adhered to the backing material in a three-dimensional format. The lens is thus formed layer by layer until the required structure has been achieved.

Should the optics need to be changed or adjusted, new software is developed within one or two days and sent to the printer creating the lenses in digital format. If the printer happens to be located in a lighting company, the modifications are covered by a licence agreement. The manufacturer then has the opportunity to initiate adjustments directly himself to be able to generate the product, for example a lens, on his own premises. This saves storage costs, transport costs and above all time.

When you consider that the costs for producing lenses for LED manufacture amount to around 15 per cent of the overall production costs, it is easy to see that this new invention can lead to substantial savings, since any costs incurred after initial acquisition are exceptionally low. The time that this process saves is a further huge advantage, and not only from the point of view of reduced costs, because previously this has been a real bottleneck in LED production. It may well also accelerate development, given that prototypes can now be created, modified and tested on site. This shortens the supply chain considerably.

The advantages this new technology offers lamp and luminaire manufacturers are obvious and the prospects for its use in various fields of lighting technology are good. Further developments for linear fluorescent luminaires or daylight technology are perfectly feasible, since printing sizes of up to 1.30 by 5.00 metres are currently already possible – with larger sizes pending.

The tinting of lenses to alter the luminous colour of LEDs, for example, can be undertaken easily at any time, if required. The same applies for the addition of logos or other graphic elements.

Given that LEDs are the light source of the future, it is clear that their importance on the market is bound to grow significantly. Optical light control will become more important. And OLEDs also present a field of application where enhanced control will be required to handle the higher luminances and luminous efficacies.

The first LED-sourced standard luminaire with a printed lens is already on the market, manufactured by RZB, and it has won a Red Dot Design Award. Designers should be inspired by this, because the minimal thickness of the lenses and diffusers also mean more creative scope for interesting product designs.

The industry may well be confronted with a few more surprises from Luxexcel in the near future. Although this ground-breaking technology is already widely applied today, it is really only at the start of what it can accomplish. The future has begun!

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