



Design *freedom*

The designer's imagination really can run wild with thin leds and printed lightguides. By Iain Kyle.

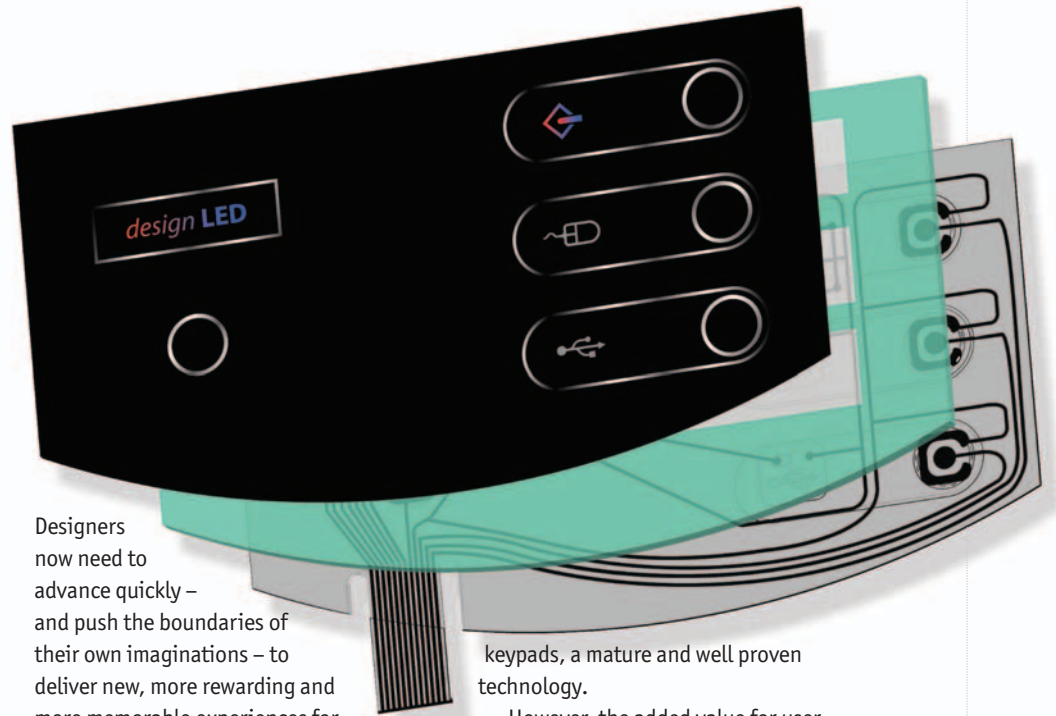
New lighting technologies that support more sophisticated user interfaces and persuasive branding are critical for OEMs seeking to differentiate high tech products in today's increasingly competitive markets.

Whilst products that are seen to be different can secure better margins for their vendors, today's discerning consumers need to see appreciable value in the differentiating features on offer. This is a tough situation for product developers in all areas, including high technology.

Today, where OEMs have access to similar components and manufacturing capability at similar pricing, market success depends on the ability of designers to create features that differentiate their product.

Design LED believes that aspects such as industrial design, styling and branding are critical areas where OEMs can – and must – deliver tangible added value. Moreover, advanced lighting solutions are critical to addressing these opportunities effectively. These can provide an easy, low cost way to create products with high visual impact.

The value added by Design LED is to create a 'light guide sandwich' comprising a flexible pcb, side emitting leds and printed light guides and an upper graphic. This allows designers to create thin layers of light or illuminated graphics on the outer surface of their product. The flexible tail connects to the motherboard and there is no need for a pcb with top emitting leds to be located immediately behind the illuminated areas. At a stroke, designers and OEMs get the freedom to create new and innovative products.



Designers now need to advance quickly – and push the boundaries of their own imaginations – to deliver new, more rewarding and more memorable experiences for end users.

Look and feel

Delivering persuasive user experiences demands increased flexibility to manage light, for example by creating ultra thin, highly imaginative displays and switches that convey a feeling of high technology and high quality to the user. Design LED opens this door for designers by combining robust and inexpensive technologies alongside key innovations to enable thin, flexible colour displays only 1mm thick. Our printed light guide technology allows designers to create segmented patterns of light in a choice of colours – or continuously changing colours, if required. The fundamental manufacturing process steps are the same as those used to create membrane

keypads, a mature and well proven technology.

However, the added value for user interface designers lies in a number of patent protected innovations that bind these technologies together into a cohesive solution for light management applications.

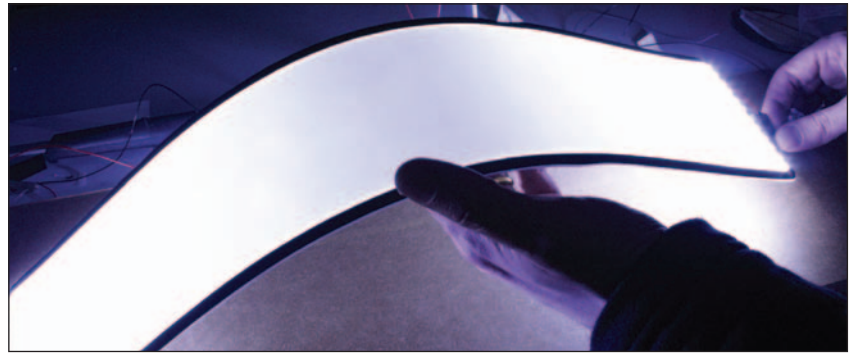
The main production processes, which include screen printing and lamination, are already proven in mass production situations. The accompanying patented IP is complementary to these core processes and does not compromise manufacturability or aspects such as production rate and yield. Fulfilling the foreseeable opportunities for ultra thin flexible illuminated panels is therefore not contingent upon any further significant technical developments. Instead, new applications are the key to the future.

In addition to panel thinness, one vital attribute that all users will expect to see is



uniform brightness throughout the illuminated area. Since the human eye associates even uniformity with positive perceptions, this is key to establishing the image of a high quality product.

Additionally, powerful effects can be created. For example, designers can animate user interfaces by using selective illumination. Adding a capacitive switch sense pad also allows illuminated touch controls. Further design options include icons and controls that are hidden until lit. This allows a blank, clean front panel to make a particular switch visible only when the current operating mode is able to respond to the user's action. These are some of the styling directions and new ways of interacting that user interfaces



Designers can also use led lighting more readily and in a wider variety of applications and locations, to take advantage of the energy saving attributes inherent in led technology. The automotive industry is already converting these energy savings into reductions in carbon emissions, while other important applications include street illumination and traffic lights.

The most important challenges centre on helping designers working in these areas – who are not necessarily familiar or even comfortable with using electronic devices – to understand what this new technology can do for them.

Some interesting early concepts have included a uniform, high intensity light disc, which could be used in machine

the display while the machine is busy to mimic activity, and using colour change on completion of activity or change of mode, builds the image of a high-tech appliance that communicates more naturally with users – and is fun to use. And when the machine is idle, the manufacturer's logo can be illuminated - your imagination really can run wild.

The flexible 1mm thick panel can be installed as part of a curved design to enable the designer to radically change the appearance of many types of appliances in use today. Obviously, the image presented is more sophisticated than is possible using older technologies such as a mechanical switch with an embedded bulb. This comparison hints at a multitude of applications, such as industrial control panels, vehicle dashboards, security alarm systems, medical instrumentation, vending equipment and ticketing machines.

Thinking more laterally and in the longer term, development of printed light guide technology will be predominantly application driven. We are finding successful ways to demonstrate how existing products can make significant advances. However, it is even more exciting and challenging to identify those applications that currently do not exist – but for which there is a powerful and unsatisfied demand. Achieving this will depend upon helping people from outside the traditional led user communities to turn on the possibilities. ■



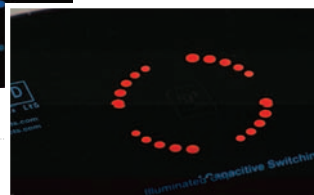
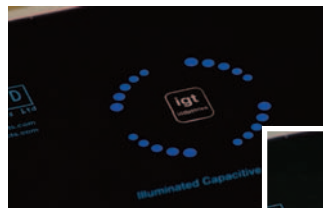
"... designers [can] create thin layers of light or illuminated graphics on the outer surface of their product." Iain Kyle, Design LED

can now adopt, at a realistic cost, in high volume products.

This technology also supports many new ways for designers to create 'localised lighting' solutions, such as handrails, bezels and frames, skirting boards, keyholes and other lighting that may benefit from illumination - either for practical purposes or simply to create an enhanced aesthetic effect.

vision or similar applications where space for the light source is very constrained.

Among new user interface applications, an animated switch incorporating a capacitive touch sensor has been used to create an eye catching front panel for a domestic appliance. Selectively illuminating segments of



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