Transparency in design

Transparent displays may allow designers to see through the challenges and explore opportunities. By **Simon Fogg**.

Earlier this year, HP was granted a US patent for its see through screen technology, sparking interest among consumers in the future of transparent displays. To many, the concept seemed futuristic, but in certain applications, it is already a reality. Transparent oleds are arguably still constrained to laboratory prototypes, but according to Crystal Display Systems (CDS), transparent tft displays are now commercially appealing.

Chris Bartram, md of CDS, said the technology for these displays has existed since tft lcds became popular in flat screen tvs, but noted that development has accelerated due to increased use of digital displays in retail. "The technology has been there for a while, it's only now that it's being used in a different manner," he said.

The company's latest Samsung tfts rely on the same components as those designed for laptops and desktops which use a white backlight – the same white that appears on the screen. With the backlight removed, what would appear white on a regular display becomes transparent and lets light through.

"The easiest way to understand how the transparent tft works," said Bartram, "is to imagine your flat screen tv at home and then you take away everything that's behind the glass – the backlight, electronics and the plastic housing."

The result is that when the display shows black pixels, the user can't see through it, but with white pixels, they can. Using this spectrum, colours in between appear more or less opaque.

"If we've got a box with products inside, we can make them appear and disappear, or gradually appear, depending on the content that's actually on the screen," said Bartram.

CDS supplies the individual components – from the panel to the power supply – but also provides 'plug n play' solutions. The ClearVue 220 is a 'transparent showcase' – essentially a display box featuring a fabricated steel enclosure, 22in transparent lcd screen and internal led lighting. The display has a resolution of 1685 x 1050pixels, a brightness of 250cd/m2 and an integrated standalone media player. There is also an optional touchscreen.

"We've got two main types: 22in and 46in," explained Bartram. "The 22in version has the electronics built on the bottom of the display, so you literally plug the display into the HDMI port of a pc or a media player. On the 46in unit, it's an lvds connection, which is standard on a tft lcd."

In order for the latter to communicate with a pc, either an interface kit featuring a pcb and connectors is supplied or a usb interface to play content straight to the screen. "As long as you've got an HDMI connection, then it's like driving any other display," Bartram noted.

Point of sale applications have been the most popular, according to Bartram, who cited purchasers such as ESPN and Disney and use cases in retail environments and museums. He said that people can often be oblivious to regular displays, but a transparent display creates a topic of discussion, particularly at exhibitions.

"There's sometimes hundreds, if not

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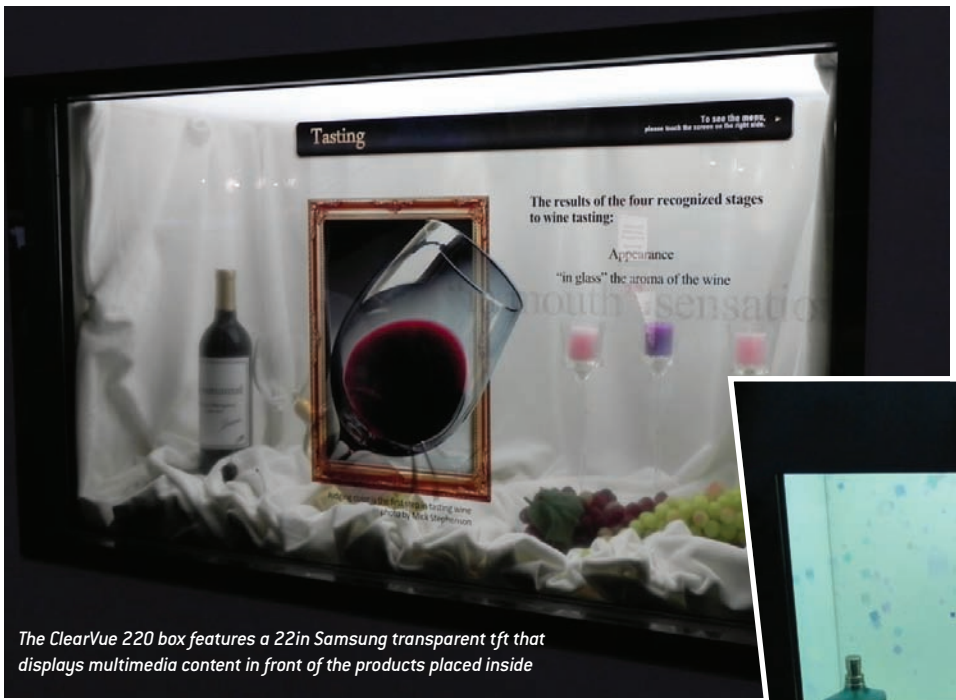
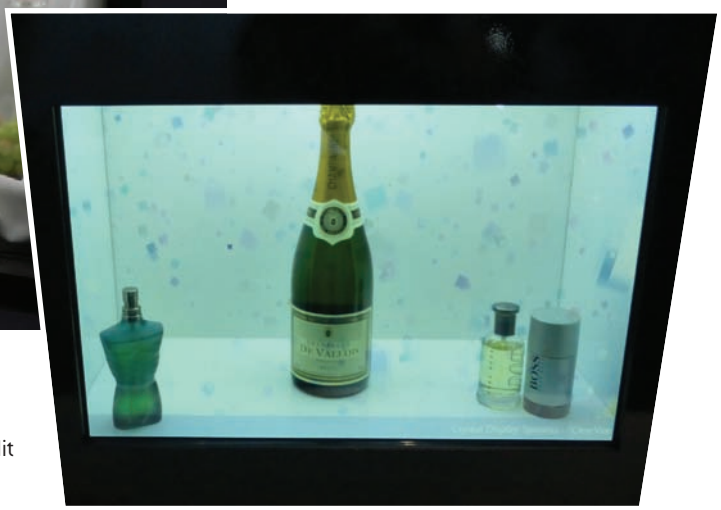
Managing director of CDS, Chris Bartram (right)



The ClearVue 220 box features a 22in Samsung transparent tft that displays multimedia content in front of the products placed inside



thousands, of stands and you've got to differentiate yourself from the rest," he said. "We were told that you've got an average of three seconds to get someone's attention as they walk past your stand."

In other industries, the technology has yet to be implemented fully, but Bartram has noticed interest for head up displays and simulators. "Those are going to be quite niche applications concerning specific projects – I don't think it's going to be a mass market product like retail," he added. CDS has sold several units to Intel for development purposes, but for the time being, such projects are experimental and kept quite secret.

When deciding whether to use a transparent display, there are tick boxes that users must consider when deciding whether the technology is suitable for their application. Bartram suggests that one concern is lighting – transparent tfts need to be backlit, so can't be used without a light source. In this respect, they are not suitable for shop windows due to issues with reflection, and even in the future are unlikely to be used for mobile devices.

"The biggest challenge is the backlight," said Bartram. "You want to get the balance between it being as bright as possible, but not too bright. If it is, then you've got potential bleed through."

Using a box system, the nature of the product within will determine the position from which it should be lit and for how long – it's important that the front does not get too hot for safety reasons. Bartram proposed optimisation of the light as a solution and the use of low power leds wherever possible for environmental reasons.

Still, transparent tfts are not limited by content and can be used like any other display. "It offers the opportunity to combine real product with digital media and content," said Bartram, "and then it's down to the ideas and the content as to how you make that happen and how you bring that to life."

But what about the alternatives? Transparent oleds initially appear to offer an advantage because they do not require a backlight, but Bartram believes these are not yet ready to be a commercial product. "The whole oled market is questionable because at the moment it's only suitable for small displays – the blue is still an issue for lifetime," he said. "At the moment, we're saying to our customers that only tft transparent displays are commercially viable."

Therefore, CDS is currently only working with technologies that can provide an immediate and tangible solution. "The reason we've worked with Samsung on these displays is that they were readily available," said Bartram. "We could get samples to test – we could take them through lifetime testing, so we're happy with the long term reliability – and get interface products to drive them."

Although transparent displays may seem futuristic, Bartram does not wish to focus solely on predicting what's coming next. "There's a place for that, it's just not the market that we deal in," he said. "Our customers are saying: 'What can I get now?'; 'What are the advantages?'; 'Does it work?'; 'Can I see one?'"

The benefit of transparent tfts seems to be how they enable users to differentiate themselves from their competition. But how will this work if the technology becomes more widely used?

"The design side will become more important," said Bartram. "As the technology improves, transparency and brightness will improve as well." The company has found the most successful projects have been those where the engineering team has had a chance to experiment with the technology – only when they've played around with it for a bit do new ideas start to flow.

Bartram concluded that transparent tfts are a technology that is evolving alongside the imagination applied when designing for it. At this stage, the innovation is in the application as new implementations of transparent tfts will be driven by creativity. "I think we'll suddenly see lots of new ideas and applications for it that we hadn't thought of," he concluded.