

# Innovation results

AN R&D CASE STUDY

#002



## Blinded by the light

It is a problem recognised by most mobile phone users – as soon as you're in bright sunlight it becomes almost impossible to see what you're doing on screen. But more than just an inconvenience, this issue could be a matter of life and death.

The ENDSENSE project was set up to tackle the problem head-on, improving viewability conditions not just for consumers but for emergency services and the marine and aerospace industries.

### The need

Enhancing the viewability of flat panel displays in bright lighting conditions such as direct sunlight is one of the major goals of the worldwide display manufacturing industry.

It is a major problem faced by all end-users – glare and image washout result in a display which is very difficult to read, whether the content is text, image or video.

The issue is particularly critical in the marine, aerospace and medical industries, where bright lighting – either natural or artificial – can affect the readability of screens carrying vital information, hampering lifesaving operations and putting both lives and costly equipment at risk.

### The results

ENDSENSE called upon extensive research carried out by universities in the UK in order to improve understanding of the factors which affect the readability of flat panel displays.

GE Aviation Systems – Newmarket and Thin Film Solutions used models created by the University of Abertay and the University of Greenwich to optimise the readability of displays through the selection of appropriate optical filters, coatings and lighting technologies.

In doing this the team was able to discover much more about how lighting conditions affect flat panel displays and could design display structures without having to build experimental trials or go through a lengthy trial and error process.

In particular the team has gained further understanding of how Light Emitting Diode (LED) lighting can be applied in conjunction with transfectors to optimise the transmission of light through the display, utilising external light reflected back through the display and vastly improving readability in bright conditions.

## The market

These advances could have a real impact on both consumer markets and industry, improving conditions for mobile phone and laptop users as well as for those using flat panel screens in safety-critical areas such as aeroplanes, operating theatres and police helicopters.

Findings are already being used in the design of the advanced display products for aerospace applications and are being keenly watched by industries involved in surveillance and crime detection, lifeboat rescue and public transport.

It is estimated that within Europe the advances made by ENDSENSE could generate £40m per annum from the safety critical display sector, which includes aerospace, medical and security, another £60m from the marine industry and £131m from the public transportation sector (source: ADRIA Network 2006).

The potential market is huge – the worldwide LED market itself is expected to exceed 20bn units in 2008 (DisplaySearch), growing from \$0.6bn to \$5.5bn by 2015 (Darnell Group 2008).



### HOW TECHNOLOGY STRATEGY BOARD MADE A DIFFERENCE:

‘The project provided us with a much clearer understanding of what we need to get the best readability – an important development for all industries using visual displays.’

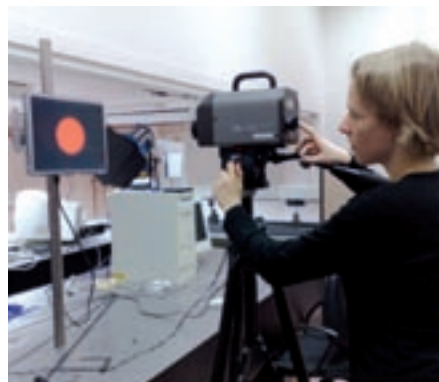
Steve Riches, Business Development Manager  
– GE Aviation Systems – Newmarket

## Next steps

The project partners have used the results from this project as the basis for another Technology Strategy Board co-funded project called ENDVIEW, which is focusing on the readability of static (e.g. maps) and dynamic (e.g. video) images.

This will extend the work carried out on LED arrays, with added input from the National Physical Laboratory on display measurement and Design LED Products Ltd on optical design.

The ENDVIEW project will also test the useability of LED products with end-users from the aerospace, marine and ATM markets, a move which could also open up new markets in associated sectors such as public information displays for transportation.



## Technology Strategy Board Driving Innovation

Collaborative research and development projects are one of the tools that the Technology Strategy Board uses to drive innovation in the UK. The Technology Strategy Board is a business-led executive non-departmental public

body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department of Business, Innovation and Skills (BIS).

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### Project 15880

#### Project partners

GE Aviation Systems –  
Newmarket, Thin Film Solutions,  
University of Abertay and  
University of Greenwich

#### Technology Strategy Board investment

£299,630

#### Total project investment

£603,269

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