SOCIETY FOR INFORMATION DISPLAY

UK & IRELAND CHAPTER

Number 31 **NEWSLETTER** **May 2000**

Introduction

Chris Williams

Reflections

This issue of the newsletter marks the point of change for the SID UK & Ireland Chapter committee. Several of the Officers of the committee retire at the end of their term of duty, and new members are stepping into their places.

As retiring Chairman, I would like to take the opportunity to thank all of my colleagues on the committee for helping me implement the activities with which we have been involved over the last two years. John Raines is taking over as Chapter Chair, and I will be EID Conference Chair. I am also standing for election as Chapter Director to replace Alan Mosley who has had to stand down due to pressure of work.

The last two years have been hard work, but very satisfying for me personally. I hope John gets as much pleasure out of the role as I have done!

Is this progress?

Regardless of whether it is mathematically correct or not, most people consider that Year 2000 welcomes in the new Millennium. At the turn of this century our politicians and spiritual leaders told us that it was time for us to sit and reflect on our values, and to determine a way forward that would be of benefit not only to us as individuals, but to mankind as a whole.

Fine words, but how difficult to put into practice.

The threat of descent into chaos from the Y2K bug has been left behind us. Business mergers at multi-media, telecommunication and Internet high-tech companies, dominate the financial news in the first quarter only to undergo a 10% downwards 'adjustment'. It seems clear that as the pace of business continues unabated, the calls for reflection and re-direction go totally unheeded.

Commercial profit drives our economy, but the 'up and to the right' short term expectations on sales and profits demand that decisions be taken now, without fully considering the long term. The continuous need for 'the marketing edge' is spawning products that older generation engineers wince at - products that are clearly badly conceived, poorly engineered, and hopelessly presented.

Our displays industry is only 100 years old In that time we have developed through several 'generations' to the point where theoretical physical limitations will apparently stop the rapidity with which technology supersedes and makes its predecessor obsolete. Perhaps hitting a technology

Two-day joint meeting with DISNET

Liquid Crystals and Emerging Technologies

27 and 28 June 2000
DERA, Great Malvern

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'wall' of great height will impose upon us the opportunity to review our objectives and expectations. I look forward to this period with great relish.

Stamping out misrepresentation - a call for action

Two examples of possible misrepresentation that should be of great concern to SID members and non-members alike are those made for the new generation of allegedly 'sunlight viewable' flat panel display monitors, and the exaggerated claims made for some of the UK based Emerging Display Technologies.

The amazing emergence of 'Sunlight-Viewable Monitors'.

The avionics and automotive markets have needed 'sunlight viewable' displays since Day One, and their technical requirements are very well researched and documented. Technology suppliers know exactly what brightness, reflectance and chrominance contrast levels they have to achieve in order to be able to satisfy the customer technical (and market legal) requirements. This information, available to all of us who work in displays, sets in detail the What? Why?, and How much? of true 'sunlight viewability' considerations.

The explosion of internet based information services, together with the rise of e-commerce, creates the need for display monitors that can be used in kiosk and wall mounted applications by Joe Public in a wide range of ambient conditions.

The historic difficulties faced by commercial large area display systems are well known. Through-the-wall ATM CRT-based cash-dispenser systems have demonstrated for years the difficulty of making electronic displays that are commercially viable and which also meet the necessary technical requirements to be truly 'sunlight viewable' with good lifetime expectations.

Yet, miraculously! as the market for these products faces a rapid explosion in size, there emerge a number of SME and OEM assemblers who offer 'guaranteed sunlight viewable' flat-panel display systems with amazing lifetime and continuity of supply claims for use in kiosks and ATM type products. How is this done? Whack up the backlight power and assume the front screen brightness is enough! Assume lifetime claims based on the highest common denominator, and with regard to long term supply, well…it'll be someone else's problem in the future.

Result? Premature field failure of products - inability to meet 'fitness for purpose'- obsolete products that die through lack of components supply - and a whole generation of end user markets that get turned off using flat panel display products because they had their fingers burned!

We have seen many examples in the past two decades where premature introduction of high technology to markets which have unrealistically low expectations of the price that must be paid to meet the technical requirements to ensure 'fitness for purpose' resulted in end-user rejection of the technology. This effect has also dampened the successor technologies that WOULD have worked in the application.

Mine's brighter and better than yours!

Similarly, the reporting of new technologies emerging from our Universities is a cause of concern. Technology needs money to fund development, but the venture-capital industry has matured into a reasonably efficient and intelligent animal that conducts detailed analyses of potential investments. Wildly exaggerated claims about device brightness, ease of colour production, size scalability, price and lifetime projections made by some of the inventors when promoting their technologies to secure more venture funding not also makes the individuals look silly, but it tarnishes our whole industry. This is particularly worsened when the claims are freely and enthusiastically reported by our enthusiastic but generally gullible technical press.

Forget the accuracy - look at the claims! might well be the press mantra when reporting on new display technology.

The displays industry is almost unique amongst major UK markets in having no major industrial trade body to speak out on key matters and work to set minimum standards. We expect self-regulation or legislation to be in place amongst all other industries that impact our daily life, so why don't we seek to establish the same facility of self-regulation for Displays Researchers, Makers, Assemblers and Users in the UK?

If you care about the industry we work in, then be prepared to stand up and be counted!

Chris Williams

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eid

EID moves to London!

We are delighted to announce that EID is (finally) moving from Sandown to the prestigious new Excel Exhibition and Conference centre in Docklands. Just 10 minutes from the centre of London, this world beating facility will provide the perfect venue for the EID three-day conference and exhibition which will be held between 21-23 November inclusive. Excel will be the UK's premier exhibition and conference location, with on-site hotel and restaurant facilities.

EID is the only regional annual conference sponsored by SID, and for some time we have wanted to move from Sandown, where the conference facilities are far from ideal, and the exhibition area is too limiting to attract the larger names in our industry.

EID 2000 marks the first opportunity to move to new facilities. The Excel facility is scheduled to open the very week of EID, so we can expect to benefit from the £3 million media spend that Excel are planning for that time. I strongly suggest exhibitors, speakers and delegates wear best suits and set the video - there is a strong probability EID will feature on London and national TV!

SID UK & Ireland will be pushing to make EID grow in importance. Since we are already well into Yr 2000 budgets, we expect it to be EID 2001 before the impact of the move will show in the form of increased bookings by the major exhibitors. We are aware that this year, EID will be at the same time as Electronica. Our conference programme will try and allow interested parties to visit EID and Electronica. In future, EID will move slightly in time to avoid the conflict.

This year we will be offering 'early bird bookings' whereby delegates who book as soon as the provisional programme is published (end of May) will receive up to 20% discount off the cost of their tickets. This feature will apply only during June and July, so watch the SID UK & Ireland web page for more details. www.SID.org.uk In addition, delegates who book for three days will receive complimentary tickets to the Dome, or the London Eye, depending on preference.

For the first time, EXHIBITORS at EID will receive a complimentary ticket to the conference. Furthermore, exhibitors who submit a paper that is accepted by the conference committee will receive a discount on their exhibition space charge, encouraging them to have a more active involvement with the whole event.

The first call for papers is now submitted for publication. Potential speakers who wish to submit papers should send abstracts as soon as possible to Chris Williams.

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Note! This year, we plan to have proceedings available BEFORE the conference in order to allow CD versions to be made for release to delegates. To achieve this, we will require all papers to be submitted in good time, in electronic format. The full timetable for EID 2000 conference will be published on the SID UK & Ireland Chapter web site (www.SID.org.uk) during May

Report on SID military displays meeting

Held at BAE System's Warton site in Preston, the meeting attracted approaching 100 delegates from 46 organisations around Europe and the UK. The meeting opened with a brief introduction by the organisers, Neville Milward and Chris Williams.

The Keynote Address on **Cockpit Displays**, was presented by Darrel Hopper of Wright Patterson Airforce Research Lab. Darrel treated those present to a fascinating overview of how his organisation contributes to the evaluation and implementation of display technologies into US military programmes.

Amongst other factors, new platforms, new operational threats and the drive for cost reductions by improved operational pay-off are driving the requirements for cockpit displays (and simulators) towards digital connectivity, improved resolution, legibility and longer life cycles.
Whilst the AMLCD is currently the preferred technology for all US cockpit displays, Darrel recognised that other technologies will still find applications due to their relative merits and availability. Recent closure of several domestic custom-glass manufacturers leaves the supplier base very limited. This has forced many US military-display manufacturers to adopt alternative solutions based on commercial glass from existing Far Eastern LCD manufacturers or adopt alternative technologies altogether.

Darrel highlighted the difference between what he referred to as;

First Tier technologies - commercially successful products that are already well established in military applications such as CRT, LCD, and EL,

Second Tier Technologies – Maturing products which are technologically sound and making inroads to military applications such as DMD, AC gas plasma.

Wannabe Technologies – Upcoming technologies which show promise but which need more work to be viable as products for military applications such as FED, OLED and solid state laser projectors.

The second paper on **Flexible head-down displays** was given by David Craig of BAE Systems,

Edinburgh. He commenced by outlining the factors that influence the design of displays for use in cockpit environments and concluded that AMLCD technology is currently one of the best to meet these diverse requirements.

He went on to look at the problems of sourcing suitable AMLCD glass for the cockpit display manufacturer. Custom glass manufacturers are now very few and the cost of the glass is high and of limited availability. Commercial manufacturers are plentiful, pricing is low, availability is good but commercial glass is rarely suitable for cockpit applications due to size, and shape limitations (aircraft typically have square holes for displays whereas commercial glass is rectangular).

To overcome these problems, BAE Systems have come up with a technique, which they have refined and patented, which effectively cuts down commercially available LCD panels to fit the required square (or otherwise) profile that cockpit displays typically require. David claims that, by suitable control of glass cutting and re-sealing techniques, they have largely managed to overcome the anticipated problems of breakage, fluid leakage, contamination, cell gap variation, electrical disruption and water vapour ingress. They now have a process that is capable of a satisfactory 60% overall yield and have successfully subjected samples to representative environmental testing including vibration, humidity and temperature cycling.

David concluded by explaining how BAE Systems had also prototyped a large high-resolution direct-view display using two commercially available LC projectors in a back-projected format. The images from the two projectors were overlapped at the display centre and a physical mask was used to blend the images together.

Demonstrations of both cut down LCD panels and the prototype projector were shown working during the break for lunch.

After lunch, the afternoon session was opened by Neil Fox of Smiths Industries, with a paper on **FED Technology for Military Cockpit Displays**. Commencing with a brief overview of the drawbacks that CRTs and LCDs have for military cockpit applications, Neil went on to highlight the potential improvements that FEDs could bring to the cockpit. These include size efficiency, temperature range, ruggedness, and lack of the lack of high voltages.

Neil reviewed the existing FED manufacturers, and several others who have FED products under development, and detailed how their approaches differed in terms of emissive structures, spacers, anode voltage and phosphors.

Despite the many players, several of whom have received significant funding, there are currently only a few commercially available products, that are predominantly small, low-resolution, monochrome devices. However Neil is hopeful that the diversity of technical approach together with the formation of the FED alliance between many of the interested parties, will lead to successful maturation of FED products that will banish the need for high-voltage supplies for cockpit displays.

Cockpit displays from the aircrew perspective – the pilot's office was the subject of the next paper presented by Paul Hopkins, Chief Test Pilot, BAE Systems.

Paul gave an interestingly informal account of how the high workload for today's pilot is driving the need for high quality, well thought out display of information in a format that helps, not hinders the pilot in the execution of his duties.

Paul went on to qualify this by showing how the displays were evolving on a number of aircraft that BAE are directly involved in including Hawk, Tornado, Harrier, Grippen and Typhoon (Eurofighter).

The last paper, **The application of head-up displays and helmet-mounted displays** was given by Chris Bartlett of BAE Sytems, Rochester). Chris commenced with the history of the head-up display from its origin in World War 2, as graticule-based, weapon-aiming systems to its widespread use in military (and increasingly commercial) aircraft of today in the familiar CRT plus combining-optics format.

Chris went on to describe the introduction of helmet-mounted displays into military aircraft. The apparently slow introduction of this display type is due to accelerate in the near future with the introduction of off-boresight cued missiles, and wide field of view sensors for night flying.

Since the head tracker reliability of the HMD is not yet good enough to allow its use as a primary flight display it is likely that the HMD will not replace the HUD for some time and they will therefore be used together.

In summing up, Chris predicted that future HUDs will be developed to include colour display, alternative display devices, smaller field of view, more use on civil aircraft. Similarly, HMDs will be developed to provide primary-flight display capability, integrate communication and life support functions, use alternative display devices and provide colour display.

To round off an excellent day all attendees were then invited to a tour of several areas at BAE Warton including the flight simulation department and Typhoon (Eurofighter) hanger.

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Electronic Materials for Displays - (EMD) Programme

EPSRC 2000 Grants Announced

Grants receiving support in the sixth and final round of Functional Material's six year, £6 million research programme were announced in April. Funding of just over £1.05 million is supporting seven grants.

The grants, in more detail (giving principal investigators only) were as follows : -

1. Rare-earth doped GaN powder phosphors for full colour long life AC electroluminescent displays, Andy Wright NEWI. This is a novel and fairly speculative approach which, if successful, could bring a step change in EL technology.
2. Designed light-emitting polymers for efficient energy transfer, Andrew Holmes, Cambridge. New polymers will be designed and synthesised with the aim of harnessing the charge injection energy of triplet as well as singlet excited states, with a consequent significant increase in the efficiency of energy transfer.
3. Reactive mesogens and non-contact alignment layers for photopatternable electroluminescent displays, Mary O'Neill, Hull. This proposal applies liquid crystals, photocrosslinking and photoalignment to electroluminescent displays to develop multilayer devices with better carrier transporting properties as well as novel flexible photopatternable polarised displays
4. Fast soliton-driven switching in smectic liquid crystal displays, Iain Stewart, Strathclyde. Mathematical models will be developed and exploited in order to describe recent experimental results which demonstrate fast, soliton switching in smectic liquid crystals.
5. Fast switching ferroelectric and anti-ferroelectric liquid crystals for displays and photonic devices, John Goodby, Hull. Appropriate choice of the terminal moeities on liquid crystal molecules can cause microphase separation of the chemically dissimilar segments of the structures. The approach can be used to induce wider temperature ranges for the LC state and, coupled with the incorporation of a suitable asymmetric centre, offers the prospect of many improved FLCs and AFLCs.
6. Stability of poly-silicon thin film transistors with low temperature deposited silicon dioxide, John Robertson, Cambridge. Amorphous SiO_2 gate oxides will be deposited at around 250 °C for full compatibility with glass substrates, using an electron cyclotron resonance reactor. A key aim is to improve stability by minimising the incorporation of hydrogen.
7. Dichroic and fluorescent displays using new chiral nematic flexoelectro-optic bimesogens, Harry Coles, Southampton. The main aim is to incorporate dichroic and fluorescent dyes into a recently-discovered class of highly-twisted nematogenic bimesogens with fast switching speeds. The approach offers the prospect of reflective or transmissive devices requiring only one or zero polarisers.

As in previous rounds, all the grants have attracted strong industrial backing. For further technical information on these or any other EMD grants please contact the Programme Co-ordinator, Professor Roger Heckingbottom, tel: 017687 73732, fax: 017687 74902, e-mail: heckingbottom@clara.co.uk

There will be an opportunity to see some of the current work supported by the programme at the Photonics Community Meeting, 3 – 5 July 2000 at the UMIST Conference Centre, Manchester – details will appear on the EPSRC website at http://www.epsrc.ac.uk.

Yes! We still can

Pay our subscription in the UK in Sterling. At the SID Board meeting in January, it was decided to increase the annual subscription to $75 for members who pay at the SID symposium, or otherwise pay directly to the USA.

This increase reflects the increased costs that are being incurred in running the organisation for an increasing membership. Further information about the increase and other rates that are affected, will be reported in Information Display. As many of you have pointed out, they forgot to mention that all UK members can pay their subscriptions in Stirling and the amount is £49, directly to:

Pat Crofts
49 Brookside
SANDHURST
GU47 9AP.

Please make cheques payable to SID UK.

J C Jones wins 2000 Charles Vernon Boys medal and prize from the Institute of Physics

Cliff Jones of DERA has won the Charles Vernon Boys medal and prize for his outstanding contributions to the development of liquid crystal displays. Although only 35, he has published over 50 papers and patents, covering a wide range of topics including new materials, addressing techniques, and the fabrication of displays. In particular, he has been working on producing large-area flat-panel displays and lower-power flexible displays for portable equipment. His discovery of the biaxial properties of the smectic C phase and its importance in ferroelectric liquid-crystal displays has made an important contribution to the design of FLC displays.

Another of Dr. Jones' key inventions is the Zenithal Bistable Nematic Display (ZBD). This is a novel display mode based on a grating structure for liquid crystal alignment. The work is attracting much world-wide interest, because it uniquely offers very low power, plastic display which retain their image after removal of the field and after being subjected to severe mechanical shock. His current work interests also include re-configurable holographic displays and spatial light modulators.

Dr Jones has been involved with most of the universities working on liquid crystals which includes chairing and directing the work for DERA's LC consortium. In 1997, Dr. Jones was the youngest person to be promoted to Senior Principle Scientific Officer of Individual Merit (latterly DERA Fellow).

News from other SID Chapters

SID France - Le Club Visu

The latest newsletter, infovisu, issue 41 contains a review of the conference and exhibition **Visu 2000 – Display 2000**, which took place in Paris from 13 to 16 March. There is also a paper, PDP picture quality improvement by coding optimisation by Sébastien Weitbruch of Thomson Multimedia Corporate Research.

A course on Display technology, description, implementation and applications is taking place from 19 to 22 September in Grenoble (see calendar).

There is more information on the web site which is now fully operational (www.eurodisplay.org).

Mid European Chapter

The April newsletter, issue 9 includes a report of the meeting on **Projection display systems and display manufacturing processes and equipment,** which took place at Balzers, Liechtenstein from 23 to 24 March. At the meeting, the election of the new SID-ME committee took place. Lic. Tech. J Kimmel and Dr J Bruinink were elected as successors to Dr Ing D Theis and Dr Ir K E Kuijk.

There will be a meeting on Automotive displays from 13 to 14 October 2000 at the BMW Research and Development Centre in Munich.

News from Industry

SEOS Displays Ltd

The company has recently been celebrating its fifteenth anniversary. It started in a small way in May 1984, as 'Specialised Electro-optical Services Ltd'. In 1986, it decided to concentrate on products for simulation in and the company changed its name to SEOS Displays Ltd.

The first real break was a feasibility study for DERA, or the Royal Aircraft Establishment as it then was. Although the simulator was never built, the company was established in the field and grew until today over 160 are employed in the UK and USA.

The anniversary celebrations coincided with the company consolidating in new headquarters in Burgess Hill. The new building has a purpose-built high-bay area for integrating and testing display systems. There is also increased office space.

The latest SEOS newsletter reports that the company is looking forward to increased growth in its activities in the USA following the move of Owen Wynn to Orlando in April for a three-year trip. He is planning to build the operations there to establish the possibility of long-term growth in what the company regards as an important market.

The company also reports that it has completed a programme to supply two Prodas AcuView displays to BAE Systems. These are being used in a contract for BAE Systems to provide a new fast jet training system for the RAF.

Web site: www.seos.com

News from industry (continued)

Nanox Ltd

Nanox Ltd, which is a recent spin off from the University of Oxford, recently held a celebration of the completion of its move to the University's Begbroke Business and Science Park. The company was formed to commercialise some aspects of the nanotechnology developed by Professor Peter Dobson and Dr Gareth Wakefield of the University.

Recent developments in materials science have enabled the design and manufacture of materials at the nanometre level. It is hoped that this will provide exciting opportunities to realise integrated circuits with quantum wires and single electron transistors. It is predicted that information storage using high-density nanomagnetic structures will radically alter the world of medecine.

Nanox's initial funding will allow the company to develop and commercialise product targets in nanocrystalline materials for display and cosmetic applications. Nanox's nanoccrystalline phosphor is being used in the field emission display made by Printable Field Emitters Ltd. The company plans to extend its portfolio into other nanotechnology applications.

There are many other nanotechnology activities in the Department of Materials on the same site and there are close links with other departments of the university. Activities include, nano-particle composite systems, nano-magnetic structures, nano-structured polymers and nano-ceramics

Web sites: www.nanox.co.uk, www.info.ox.zc.uk and www.materials.ox.ac.uk

Printable Field Emitters Ltd

Printable Field Emitters is developing a cold-cathode technology which it believes will lead to large-area (20″ to 42″) field-emission displays for TV and multimedia applications. At the IEE last October, the company demonstrated a device having 32 x 32 pixels based upon a triode construction.

This approach will lead to low-cost, large-area devices which have a maximum thickness of 32 cm. Advantages include low-cost, low-voltage drive electronics, high electrical efficiency and the high brightness and contrast associated with cathode-ray tubes.

Each pixel consists of hundreds of triode emitter cells approximately 10μm in diameter. The emission current can be controlled with a voltage swing of ±20 Volts. The screen is coated with standard CRT phosphors operated at a voltage between 3kV and 5 kV.

SID UK Committee

At the SID AGM which took place on 5 May at 3M, Bracknell, the following officers were elected:

Chair	John Raines
Vice-Chair	Sally Day
Treasurer & membership	Pat Crofts
Secretary	Graham Weaver
Meetings Registrar	John Mansell
Webmaster	Ian Sexton

Chris Williams is standing for election as Chapter Director

Lost!

One of the passes issued for the visit following the meeting at BAE Systems was not returned. The company would be very grateful for its return. If you have it please send it to:

Katharine Wykes
BAE Systems
Warton Aerodrome
PRESTON
PR4 1AX

Thanks to our Host Companies

We should like to acknowledge the generous support of companies and universities who give us the use of their premises free of charge, for our one-day meetings. Without this, not only would the meetings cost far more, but also they would not have the friendly, informal atmosphere which helps contribute towards their success.

Recent meetings have been hosted by, 3M, Bracknell, Hewlett Packard Research Laboratories, Bristol, Reality Vision, London, BAE Systems, Warton and the EPICentre at the University of Abertay, Dundee. We are grateful to the Scottish Optoelectronics Association who sponsored the very successful meeting at the EPICentre.

Our thanks are also due to Philips Research Laboratories, Redhill for their help with printing our newsletters.

Calendar

Date	Subject	Venue	Contact
27-29 June	Liquid crystals and emerging technologies	DERA, Malvern	John Mansell
19-22 Sep 2000	Les Technologies d'affichage et de visualisation:		
25-28 Sep 2000	IDRC - 20th International Display Research Conference	Palm Beach, Florida	
14-17 Nov 2000	8th Color Imaging Conference	Scottsdale, Arizona	
29 Nov - 1 Dec 2000	IDW'00	Kobe, Japan	
3-8 June 2001	SID Symposium	San Jose, CA	

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