

**Building Thermography 2006**

Following our successful meeting on Building Thermography last February, we are planning another meeting to update people on developments in Building Thermography techniques, standards development, European Energy Performance of Buildings Directive implementation and harmonisation of Training and certification. Watch the UKTA website for more details.

**New members  
Elyo Services Ltd**

Elyo Services Limited is a respected specialist in the operation, management and maintenance of technical installations, providing 'best in class' performance. They are part of the global services group SUEZ, which employs 170,000 people in 130 countries and has a turnover of approximately euro 40.7 Billion. Elyo Services operates in the UK and Ireland through the SUEZ Company.

With a reputation for quality, we have the experience and technical expertise to provide efficient and cost-effective management, operation and maintenance solutions for today's modern and technically complex buildings.

Each Elyo branch is structured to provide a range of services such as:  
Fire Detection and Security Systems  
Integrated Facilities Services  
Catering Equipment Maintenance  
Building Fabric Maintenance  
Energy Management  
Resident and Mobile Mechanical and Electrical Operation and Maintenance

Elyo introduced Thermal Imaging Services to their list in-house competencies using the latest Flir ThermaCAM P65 infrared camera equipped with ThermaCAM 2000 software.

**Company Members of UKTA**

**Airtightness Services**  
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**UKTA 7<sup>th</sup> AGM**

The 7th Annual General Meeting of the UK Thermography Association was held on 19 July 2005 at Kings College, Cambridge. The Chairman's report stressed the work achieved in the last year on building thermography methods. Feedback from members supported a greater emphasis on ensuring practising thermographers are properly trained and certificated. The committee was re-elected, but the post of Communications Officer was not filled. Gareth Pilmoor of BSRIA was later co-opted to this role at the next committee meeting. Members stayed for the remainder of the day's thermography presentations at the CM 2005 Conference.

**Diary**  
**9 November, Medical Thermography & Thermometry**  
 UK meeting on Clinical Temperature Measurement, NPL, Tedington.  
**20-25 November 2005, 3rd European Medical and Biological Engineering Conference**, European Conference on Biomedical Engineering, Prague, Czech Republic [www.embec05.org/](http://www.embec05.org/)  
**23-26 January 2006, Thermal Solutions**, Hyatt on Sarasota Bay, Sarasota, Florida [www.thermalsolutions.org](http://www.thermalsolutions.org)  
**February 2006, Building Thermography, London**  
**17-21 April 2006, SPIE, Thermosense XXVIII**  
 Gaylord Palms Resort and Convention Center, Florida, USA [www.thermosense.org/](http://www.thermosense.org/)  
**28-30 June 2006, QUIRT 2006**  
 8th Quantitative Infrared Thermography International Conference, Padova, Italy, <http://qirt2006.pd.cnr.it>  
**11-14 July, WCEAM 2006**  
 First World Congress on Engineering Asset Management, Conrad Jupiter's Conference Centre, Gold Coast, Queensland, [www.wceam.com/abstract.html](http://www.wceam.com/abstract.html)  
**15-17 September 2006 10th Congress of the European Association of Thermology**, Zakopane, Poland contact [ajung@wim.mil.pl](mailto:ajung@wim.mil.pl)  
**July 2007 CM 2007**  
 Stratford-on-Avon, UK. details see [www.bindt.org/comadit/](http://www.bindt.org/comadit/)

**Building Regulations**

The revised Part L of the Building Regulations was enacted in September for implementation in April 2006. Thermography of building fabric was not included as a recommendation. This is believed to be because the regulations concentrate on making measurable savings in CO<sub>2</sub> emissions. Thermography does not produce data on reduction in energy consumption that can be converted to kg CO<sub>2</sub>. Setting lower U values, reducing ventilation rates or setting energy targets can all be easily quantified in kWh or kg of CO<sub>2</sub>. UKTA believes that the new Asset Rating system and periodic energy efficiency surveys now offer more of an opportunity to thermographers.

This does not mean that building fabric thermography for new buildings is any less relevant than it was under the old regulations, but the need for it is now more related to build quality and the owners and end-users requirements. UKTA Civil Users Group will continue to develop standard methods and good practice guides for building thermography. Input from UKTA members to this process is essential. Contact Ray Faulkner to attend the next meeting, 1<sup>st</sup> December at iRed, Havant.

**Industry news**

**Land launches World's Smallest Hand Held Thermal Imager**

The mobile phone-sized Land Guide M4, the world's smallest, lightest and most advanced thermal imager is now available from Land Instruments International.



Incorporated into the low-cost, compact design are advanced features such as fingertip controls, high quality thermal and visual images with voice annotation, on-board image processing, a large capacity memory and versatile USB connectivity.

Specification includes a sensitivity of 0.12°C, measurement range -20 to 250°C and high-resolution, 160 x 120 pixel, 8-bit thermal images. High quality digital images captured by the built-in visual camera, and a built-in laser locator help to pinpoint hot spots. There are four measurement modes - simultaneous four-spot and four-area analysis, line profile and isotherm analysis - all of which can be saved as images.

The position and temperature of the hottest spot within the image is tracked and indicated by a cursor, and a second cursor in the image centre is used to indicate the temperature and provide a reference for inspection analysis. An audible alarm is activated when the measured temperature exceeds a pre-set value. The Guide M4 has a 1Gb memory for recording and on-board storage of over 600 files, each of which can include a thermal and visual image with voice annotation. For further information please contact: Tom McDougall, Land Instruments International

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**UKTA mission statement**

*"UKTA is a professional association dedicated to excellence in all infrared imaging applications, supporting, promoting and expanding infrared imaging and measurement. It is formed to network individuals, organisations and associations in the thermography profession in the UK and the rest of the world. UKTA has formed alliances with other associations of similar objective in other countries."*

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 Committee: Chairman - Norman Walker, Vice Chairman - Ray Faulkner, Treasurer - Phil Kolbe,  
 Secretary - Colin Pearson, Medical Section - Dr Kevin Howell.

**Training & Certification**

There are currently two accredited training organisations, ATOs [iRED and FLIR], with Institute of Infrared Thermography [Canada] being audited at present. One or perhaps two training organisations from the USA have expressed an intention to apply to become ATOs in 2006. Two more UK companies are also intending to apply in 2006. AINDT in Australia will become an AQB/AEC for BINDT and will promote BINDT certificated training and examinations in the ASEAN region for IRT other methods.

**Case Study: Investigating a LV breaker behind cover**

*Bob Arvell - Thermal Imaging Services*  
This study describes how a number of serious and critical hidden defects within a main LV breaker were identified during a survey. The breaker, installed in the 1960's, has no fuses and consists of three knife contacts at each of six breaking points (see fig 11). Rated at 800 amps, it was operating under a load of 450; 400; 300 amps on the three phases but was known to sometimes operate at or close to its maximum rated load.



Fig 1 The LV breaker

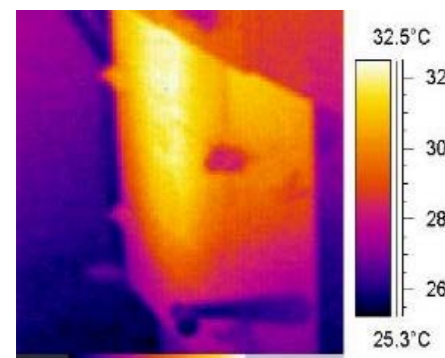


Fig 2 Thermal image of its surface  
A scan of the front surface, fig 2, showed a raised surface temperature slightly to the left of centre. Considering the load balance this was to be expected. So far there was nothing to indicate the surface

temperature, although high, was not due to the breaker being (possibly) toward the front of the enclosure. On this occasion however the busbar chamber and the breaker were openable and a more informative thermogram obtained, fig 3.

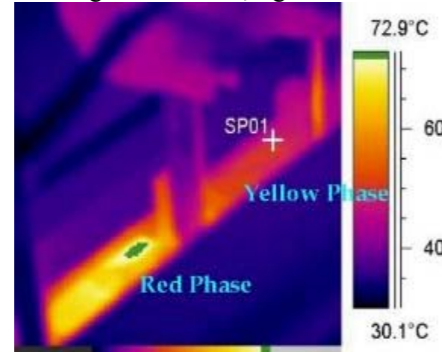


Fig 3: Image of busbar connectors



Fig 4 Image covers this area

This showed (1) the red phase busbar connector had a much higher temperature than that of the yellow phase and (2) the yellow and blue phase connector temperatures were similar. We still could not say just where the heat source was situated. Was it at the red phase busbar connector, or at some other point inside? A clue was given by the similarity of the yellow and blue phase busbar connector temperatures which had a 100 amp difference in load. This anomaly indicated both a need for further investigation, and that there was probably more than one defect.

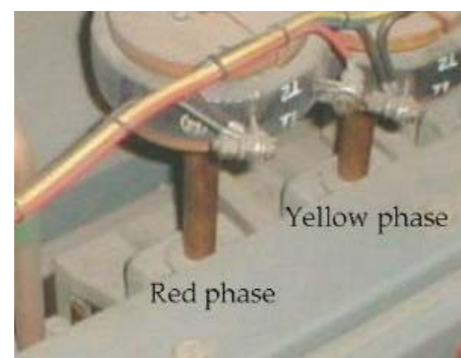


Fig 5: Fig 4 area enlargedThe maximum temperature, at the red phase

busbar connector, was 72.9°C and a reference temperature of 47.9°C was obtained from spot marker SP01 on the yellow phase connector. To allow for the temperature drop between the hidden defects and where the maximum temperature might be we used an amendment factor to make an educated guess.

$$\text{formula } (T \text{ Max} - T \text{ Ref}) \times F \text{ gave}$$

$$(72.9 - 47.9) \times 3 = 75^\circ\text{C}$$

the possible temperature rise due solely to the defect.

A critical defect was suspected, but how close was this assessed temperature to the actual temperature at the defects? Due to its probable severity, the situation was reported to site management immediately. As the breaker fed one of the main distribution centres for a district hospital, they accepted our suggestion that some further investigation be carried out immediately. Taking all the necessary safety precautions, the hospital's electrical engineers opened the front door of the breaker while it was live and thermograms were obtained of each phase. They show the assessed temperature fell between the maximums actually found but the red phase was hottest.

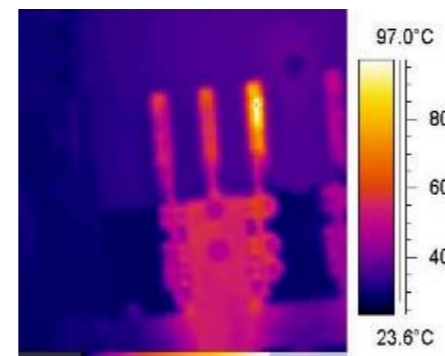


Fig 6: Red phase output knife contacts

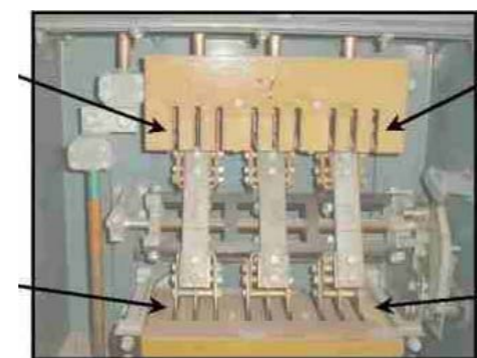


Fig 7: The areas covered by images. Red phase (Fig 6) outgoing knife contacts, top left

**Polish Thermology Conference - continued from last issue**  
*By Roy Smith, Kevin Howell, Royal Free Hospital, London, UK and Roderick Thomas Swansea Institute*  
Kevin Howell (Royal Free Hospital) presented data showing measurements of body temperature and laser Doppler blood flow at six body sites (fig.6) and looked also at contralateral asymmetry in both thermographic and laser

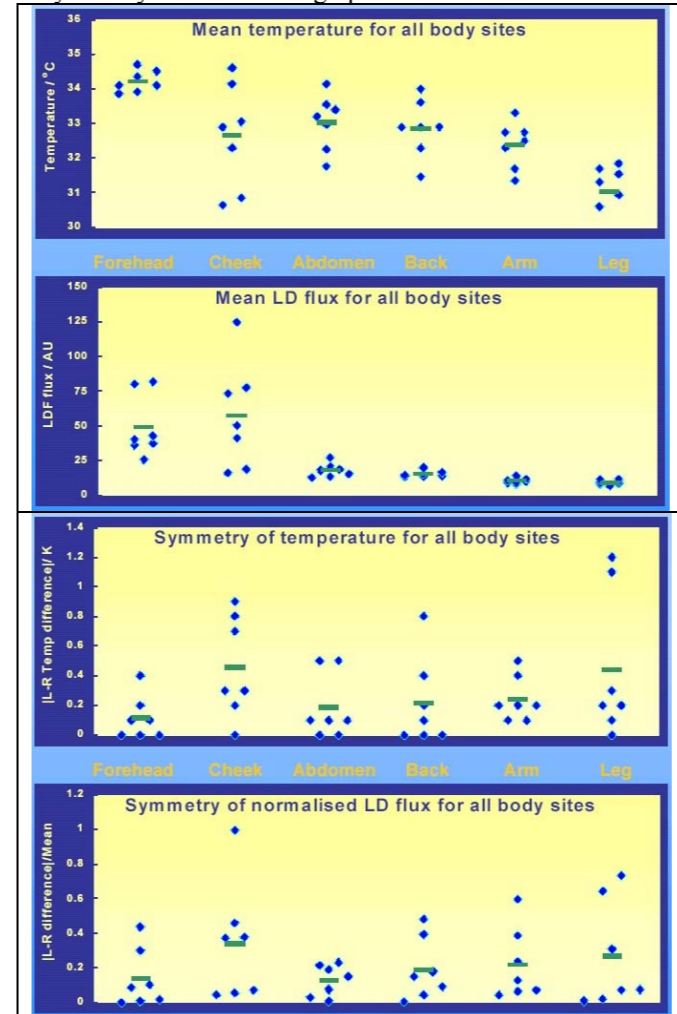


Figure 6, Relationship between body temp. and blood flow

Doppler measurements. His data cast some doubt on the current notion that a 0.5°C contralateral difference is always pathological: of particular importance in his group's study of localised skin inflammation in morphea. Carl Jones (University of Glamorgan) presented an "average thermographic man." He explained that despite many different applications and studies, a database of normal human thermograms is not available. To construct such a database, volunteers were recruited and screened for normality using the EuroQol (EQ5D) questionnaire. Twenty four standard thermographic views of normal volunteers were then recorded, using standard masks in each case to minimise the variability in position between subjects. Normal subjects were divided into categories, for example males aged 18-30, so that images of the standard views for each category could be combined. Before combining the images of different subjects, the images were warped to allow subjects of different shapes to fit exactly into the standard masks. The combined images provide information about the mean and variability of temperature in the standard views for a given category of normal subjects. The mean image for the category of males aged 18-30, total

body view, is seen in fig. 7, the standard deviation is shown in fig. 8.

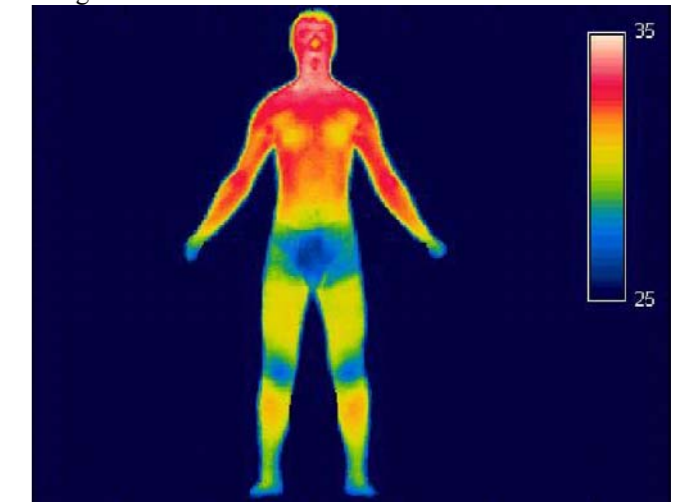


Figure 7, Mean thermal image of males 18-30

Peter Plassmann (University of Glamorgan) suggested two positive steps to improve standardisation of thermography. Firstly, to adopt standard body positions by aligning thermographic images with templates, and then morphing every image to fit the template to allow intersubject comparison. Secondly, as the absolute temperature accuracy of thermal cameras is only ±2 °C, every image should contain three different thermal references, a trailer for work that is currently in progress. In summary, this meeting presented a wide range of clinical applications for thermography.

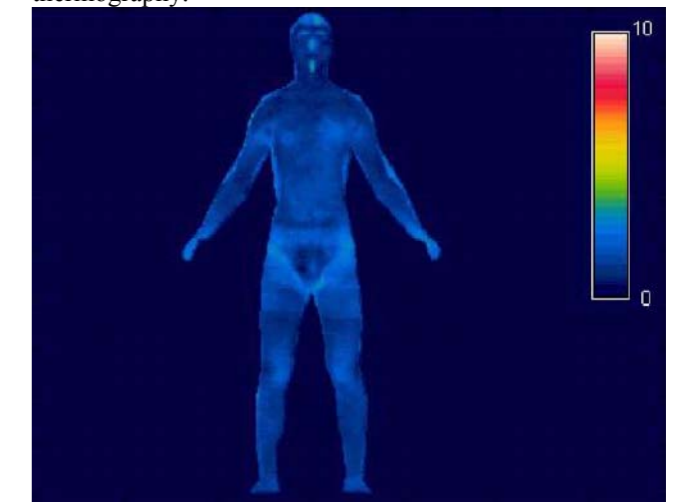


Figure 8, Standard deviation thermal image of males 18-30

It also demonstrated that clinical thermography is not a facile art. Every aspect of the measurement process must be controlled: patient preparation, the measurement environment; image quality and camera function; standard patient positions; and the presence of calibration sources. Internationally, a wide range of skills and experience are available, and this congress of the Polish Association of Thermology contributed greatly to reaching consensus on best practice. The 2005 UK meeting on Medical Thermography and Thermometry, organised by IPEM and cosponsored by UKTA and NPL, takes place on 9<sup>th</sup> November 2005 at the National Physical Laboratory, Teddington. Visit the "Conferences" section at [www.ukta.org](http://www.ukta.org) for more information on this and the next European Congress back in Zakopane in September 2006