

HSE HORIZON SCANNING INTELLIGENCE GROUP SHORT REPORT

APPLICATIONS OF RFID TECHNOLOGY

1. Issue

Radio Frequency Identification (RFID) is a method of storing and retrieving data using wireless systems,¹ comprising a tag (also known as a transponder, smart-label/card/ticket); a reader/scanner, which can be either fixed or hand-held, and a host computer plus software. Data is stored on the tag and exchanged with the reader via radio transmissions between the two components. Typically, these transmissions occur in the High Frequency or UHF range although a move into the microwave region is predicted. The majority of the tags in use currently are “passive” devices, which need to come into close proximity with the reader in order to be powered inductively to enable them to transmit or receive data. More complex and expensive “active” tags are also available, having a built in power source (i.e. a battery) These can operate over greater distances from the reader and typically have a larger capacity, higher data transfer speeds and increased read/write capability.

Status: Active Monitoring

Applications of RFID technology are expanding rapidly,² with worldwide sales of the tags reaching an estimated 1.3 billion in 2006. From managing stocks of goods through to tracking the movement of tools, equipment, people, animals or even wheelie bins, the use of RFID tags seems set to become pervasive. Transport for London’s Oyster Card and RFID-tagged tickets for the 2006 World Cup provide examples of the application of the technology in payment systems and anti-counterfeiting, respectively. The new Airbus A380 is reported to contain over 10,000 tags for part and maintenance tracking, while uses are foreseen in healthcare, access control and a range of transport and safety-related applications.³ The use of RFID technology has also been proposed for improving safety in a range of applications, including exposure monitoring in the nuclear industry, location tracking of miners and in personal protective equipment (e.g. safety boots incorporating an RFID transponder linked to equipment cut-outs). Similarly, numerous transport safety applications and process monitoring and control systems are being developed, such as RFID controlled safety cut-offs, conveyor safeguarding and systems to prevent prohibited process steps (e.g. the filling of containers, which have not been cleaned). In the longer term, the incorporation of RFID technology into wearable computers and its use in combination with a variety of environmental sensors (for temperature, motion, chemicals etc.) are foreseen as part of the development of “Pervasive Computing”, to enable more “natural” interactions between humans and computers.

2. Relevance to Occupational Health & Safety

RFID technology offers a range of potential benefits in e.g. access control, process safety, medical, collision prevention and personal protection applications. However, RFID systems provide an additional source of exposure to electromagnetic radiation for both operators and the public, with the associated health & safety concerns, which this raises. Other possible occupational health & safety issues include:

- Hazards resulting from accidental or malicious corruption of data, where the tags are being used in safety-critical situations.

¹ see e.g. POST note on RFID: <http://www.parliament.uk/documents/upload/POSTpn225.pdf>

² see e.g. the RFID Journal: <http://www.rfidjournal.com/>

³ Automatic Data Capture Opportunities for Health & Safety in Industry, HSE Research Report 080, C.D.Daniel, 2003: <http://hse.gov.uk/research/rrpdf/rr080.pdf>

- The potential for interference between the RFID systems and items such as hearing aids and medical implants.
- Concerns, which have been raised already by the trade Unions over the apparent “dehumanisation” of workers, where RFID tags are used to track and monitor performance. Should workers be or feel compelled to wear such tags, then it may be that this could lead to additional stress in the workplace.
- Increased risk of MSD’s, which may result from extensive use of handheld or wearable RFID readers.
- The potential for over-reliance on automated safety systems based on RFID tags, which could result in accidents if the systems were to fail for any reason.

3. Implications for health and safety

The wide range of applications for RFID tags implies that there is the potential for extensive contact with the technology in the workplace. Manufacturers of RFID systems argue that as the power levels and exposure times of the transmissions between the readers and tags are relatively low, compared with mobile phones for example, then the associated health & safety risks are also low.⁴ This may well be the case but studies to date appear to provide little definitive evidence to either support or challenge this view.⁵ Furthermore, if the predicted extension of RFID technology into the microwave region occurs in the future, then this could necessitate a re-evaluation of this position. Of the other issues raised by the use of RFID technology, those which are already the subject of public concern and debate include questions around the potential for loss of privacy and individual control implied by some of the proposed worker tagging and monitoring applications.⁶ Should this give rise to additional work-related stress, this could have implications for HSE’s FIT3 (Fit for work, fit for life, fit for tomorrow) and successor programmes, which are aimed at reducing ill health and lost time resulting from workplace issues. The technology is available already for implanting RFID tags into human beings and this is being trialled in the U.S. for example for patient identification in hospitals as a means of reducing treatment and medication dispensing and administration errors. While applications such as this may well have clear societal benefits, they are seen by some as raising questions over civil liberties and personal freedom and are viewed as another step on the road towards a “Big Brother” society.⁷

4. Recommendations

The applications of RFID technology are expanding rapidly and while there are a number of clear commercial and societal benefits from its use, these are associated with a number of potential health & safety concerns. The extent to which RFID systems represent a significant occupational risk in terms of exposure to electromagnetic radiation and other hazards such as stress, MSD’s or data corruption in safety-critical situations, are as yet unclear and may warrant more in-depth investigation.

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⁴ see e.g. Cisco Systems White Paper: <http://snipurl.com/10qx3>

⁵ see e.g.: http://www.hpa.org.uk/radiation/publications/w_series_reports/2002/nrpb_w24.pdf, Epidemiology of Health Effects of Radiofrequency Exposure, A.Ahlbom et al, Environmental Health Perspectives, Vol.112, No.17, p.1741-54, 2004.

⁶ For the GMB view see: <http://www.gmb.org.uk/Templates/Internal.asp?NodeID=92057>

⁷ see e.g. http://news.com.com/Human+chips+more+than+skin-deep/2009-1008_3-5318076.html