James Tingay, Cirrus Research plc

Cirrus Research plc
dedicated to noise measurement

Noise Measurement 1

Meeting the challenges of employee noise exposure in the oil and gas industry

Noise exposure legislation, designed to protect the hearing of employees and prevent noise nuisance, is becoming tougher and more widespread.

It's a response to our increased understanding of the damage that noise can do to hearing and the negative impact it can have on quality of life in the wider community.

It has resulted in a growing need to measure noise and a rising demand for noise measurement equipment.

Noise exposure regulations differ across the globe and with most companies in the Upstream Oil and Gas industries operating on a global scale, compliance with these different regulations can be a technical and logistical challenge.

Cirrus Research plc provides a range of noise measurement instruments which have been designed to provide noise measurement solutions.

In particular, the doseBadge Personal Noise Dosemeter is widely used in the Petrochemical and Mining industries where the robust design, ease of use and compliance with standards is unique.

This article looks at some of the issues and challenges companies are faced with when considering noise exposure measurement, reporting and management.

The challenge of meeting noise exposure regulations

In February 2003, the EU Directive 2003/10/EC[1] was passed and this specified the minimum health and safety requirements regarding the exposure of workers to the risks arising from noise.

This directive applied across all of the then member states who had a period of time to enact the directive as National legislation. In the UK, this was implemented as the Control of Noise at Work Regulations 2005[2].

The impact of this Directive was to reduce by almost 60% the exposure limits of noise for employees in all EU member states.

Many companies who are based outside of the EU who are looking to meet the highest levels of health and safety have adopted these new lower noise exposure levels as a corporate standard. Even where local regulations require different measurements and where different exposure limits apply, compliance with the EU Directive maintains the highest standards.

As an example of this, an EU based company operating in the US will be required to measure and report noise exposures in accordance with the US OSHA[3] regulations. At the same time, monitoring noise exposures for assessment against the EU Directive may be required to meet internal company standards.

This often presents a technical as well as a management challenge as reporting noise exposures to two very different sets of regulations can be problematic.

The technical differences between the OSHA and EU standards can result in some dramatic differences in the reported noise exposures.

As an example, a noise measurement was made using both the EU and US standards and the information calculated and reported as shown in Table 1.

EU Configuration		US (OSHA) Configuration	
$L_{Aeq,t}$	92.6 dB(A)	L_{AVG}	88.9 dB(A)
$L_{EP,d}$	92.1 dB(A)	TWA	88.1 dB(A)
% Dose	511%	% Dose	75%

Table 1 Comparison of a noise exposure measurement using the EU and US occupational noise standards

The most obvious difference in these two sets of data is that the US OSHA configuration records the noise exposure as 75% of the allowable daily level whilst the EU configuration records the same noise as being 511%.

For the same noise level, the EU regulations consider

the exposure to be almost 7 times higher than the US regulations.

The noise level to which this employee was exposed was the same for both sets of data, highlighting the need for a common baseline against which any data can be compared.

Setting a reference point against which any noise exposure can be compared, regardless of location, can be essential in providing the highest level of care for a company's employees.

Choosing the appropriate noise measurement tools

To meet these requirements, the use of the most appropriate noise measurement tools is essential. Using a common procedure across a wide range of locations, sites and operations can assist in ensuring consistent measurement, reporting and analysis of noise exposure levels.

"although handheld sound level meters have been widely used over many years for noise measurements, their use in hazardous zones has a number of limitations."

The most obvious of these is that an operator is required to be with the unit at all times. If the person under assessment is moving around a site, this can cause problems with access, safety and accuracy of the measurements.

A less obvious problem is the physical size and weight of a sound level meter. These instruments have been designed to be hand carried and so they are often large and can be cumbersome.

In many cases, the most appropriate instrument to carry out these measurements is a personal noise dosemeter. In addition to this, the level of Intrinsic Safety, discussed later in this article, available from sound level meters is often lower than that available from noise dosemeters. In the petrochemical industries, a very high Intrinsic Safety rating is often required for test and measurement equipment.

Personal noise dosemeters

Personal noise dosemeters, or dosimeters, are often the ideal tool for the measurement, assessment and management of an employee's noise exposure. The current generation of these instruments are light, robust and simple to operate.

The primary advantage of a noise dosemeter over a sound level meter is that the instrument is carried, or worn, by the person under assessment. This ensures that the measurement data accurately represents the true noise exposure and that the data can be used for analysis and reporting.

By using an instrument that has no user interaction and that has no controls, displays or cables, the risk of accidental damage or tampering is dramatically reduced.

The Cirrus Research plc doseBadge has been specifically designed to be used in environments where there is a risk of damage, tampering or misuse. Widely used in the petrochemical and mining industries worldwide, the Cirrus doseBadge is the ideal tool to make these measurements. By removing all of the controls, cables, buttons and display from the instrument, Cirrus has produced a unique measurement instrument that is capable of meeting any noise regulation or standard worldwide.

It is capable of calculating two sets of noise data simultaneously which enables the doseBadge to be used in applications where, for example, OSHA and EU noise exposures must be calculated.

If the noise measurements are to be made in areas where there is a risk of explosion, then Intrinsic Safety must be an essential feature of any noise measurement device.

However, the different levels and types of Intrinsic Safety offered by noise measurement instruments, and noise dosemeters in particular, can often be confusing.

Selecting the required level of Intrinsic Safety

The ATEX Directive[4] (94/9/EC), introduced in July 2003, was introduced as a common approach to lifting barriers to trade within the European Economic Area for Intrinsically Safe equipment.

The aim of the ATEX Directive is to allow the free trade of marked equipment and protective systems within the EU by removing the need for separate testing and documentation for each Member State.

The Directive is a mandatory requirement for all equipment of this type being sold in the European Union from the 1st July 2003 and any equipment that is sold in the EU, which is designed to be used in potentially explosive atmospheres must carry an ATEX Approval.

However, although the use and understanding of ATEX is now widespread in the EU, for manufacturers who are looking to sell their products outside of the EU, further certifications are often required.

As an example of this, shown below in Table 2, are the Intrinsic Safety Certifications provided by the Cirrus Research plc doseBadge™ Personal Noise Dosemeter.

Certification		Group II Non-Mining Applications	Group I Mining Applications
ATEX		Ex II 1 G	Ex I M1
EEx		EEx ia IIC T4 -20°C ≤ Ta ≤ +60°C	EEx ia I -20°C ≤ Ta ≤ +60°C
IECEx		IECEx BAS 06.0084 Ex ia IIC T4 -20°C≤Ta≤ +60°C	IECEx BAS 06.0083X Ex ia I -20°C≤Ta≤+60°C
MSHA	Approval No. 18-A060027-0		
SIMTARS	IECEx SIM 07.0004X		Ex ia I -20°C≤Ta≤+60°C

Table 2 Intrinsic Safety Certification for the Cirrus CR:110AIS doseBadge Noise Dosemeter

The range of different certifications and approvals that are available for Intrinsic Safety can often lead to confusion and there is a risk that instrumentation used does not meet the requirements of the user or does not provide a sufficiently high level of protection for the environment in which it will be used.

"however, an assumption that because an instrument carries an Ex or ATEX mark it will be suitable for use in any hazardous environment is wrong and could have potentially dangerous consequences."

As an example, the EEx Certification carried by the Cirrus CR:110AIS doseBadge for Group II Non-Mining applications is EEx ia IIC T4 (-20°C ≤ Ta ≤ +60°C) whilst the ATEX Certification is II 1 G.

The information provided by these certifications is different as shown below and care must be taken to ensure that these are suitable for the environment(s) in which the equipment will be used.

EEx Certification

Ex	Intrinsically Safe
ia	Gas Zone 0
IIC	Gas Group (Hydrogen)
T4	Maximum Surface Temperature (135oC)

ATEX Certification

II	Non-Mining Applications
1	Very High Protection
G	Zone 0 (Gas)

The manufacturer or supplier should be able to demonstrate and provide documentation that the instrumentation offered meets any stated standards or certifications claimed and users must be able to access this data.

Ultimately however it is the responsibility of the operator or user to ensure that the level of protection provided or the certification carried by the device is sufficient and suitable for their application.

IECEx – A Global Certification Scheme

The introduction of the IECEx Certification Scheme[5] by the IEC has gone someway to resolving this issue. IECEx is an International Certification Scheme covering product that meets the requirements of International Standards.

The IECEx Certified Equipment Program provides both a single International Certificate of Conformity that requires manufacturers to successfully complete as well as a "fast-track" process for countries where regulations still require the issuing of national Ex Certificates or approval.

This is achieved by way of global acceptance of IECEx equipment Test and Assessment Reports. An IECEx Certification was granted for the CR:110AIS doseBadge by Baseefa. To allow the instrument to be used in Australia, a local certification was required.

Under the IECEx Scheme, a certification was issued by SIMTARS[6] to cover this requirement.

Putting these requirements together

Putting all of these requirements together would lead us towards a noise measurement instrument that would have the following features:

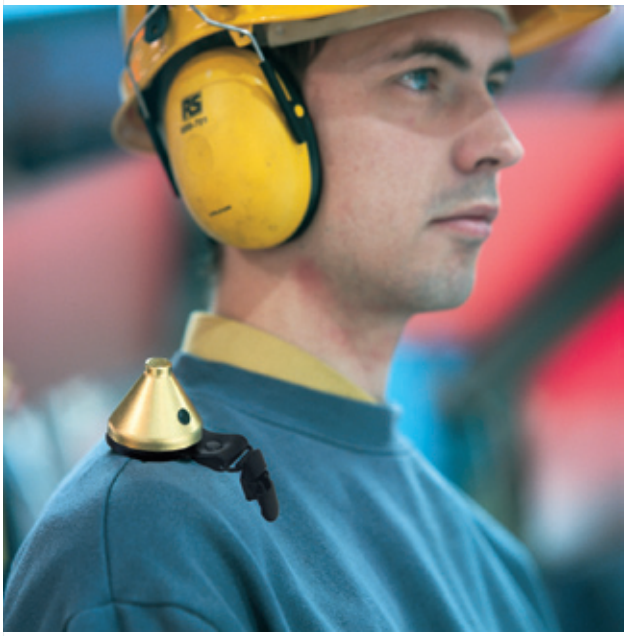
Compliant with noise exposure regulations

Can the instrument meet the requirements of any noise exposure regulations, standards or guidelines?

If the company standards are towards the EU Directive, can the instrument also meet any local regulations (OSHA for example)?

Simple, robust and reliable

Complex instruments are often complicated to operate.



Choosing an instrument that is robust, preferably in a metal case and that has proven field operation is essential.

Training and servicing costs can often be significant with instrumentation so an instrument that is simple to use can help to reduce servicing and training costs.

Intrinsic Safety

Does the level of Intrinsic Safety meet with the requirements of the hazardous zones or areas in which it may be used? For use in the EU, an ATEX Certification is mandatory.

For outside of the EU, look for local (if appropriate) or IECEx and EEx Certifications.

In many applications, a personal noise dosemeter would be the best solution for these requirements. The Cirrus doseBadge™ has all of these features and is the ideal tool for meeting the requirements of employee noise exposure measurements.

References

1. DIRECTIVE 2003/10/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)

2. Control of Noise at Work Regulations 2005
http://www.hse.gov.uk/noise/regulations.htm

3. U.S. Department of Labor Occupational Safety & Health Administration
http://www.osha.gov/SLTC/noisehearingconservation/index.html

4. ATEX DIRECTIVE 94/9/EC
http://ec.europa.eu/enterprise/atex/guide/index.htm

5. International Electrotechnical Commission Scheme for Certification to Standards Relating to Equipment for use in Explosive Atmospheres
http://www.iecex.com/

6. SIMTARS
http://www.dme.qld.gov.au/mines/simtars.cfm

Further Reading & Information

Cirrus Article 3 - Advice when choosing noise measurement equipment for Noise at Work

The Cirrus doseBadge Personal Noise Dosemeter

The Cirrus CR:110AIS Intrinsically Safe doseBadge Personal Noise Dosemeter

Author Details:

James Tingay, Group Marketing Manager, Cirrus Research plc

Tel: +44 1723 891655
email: james.tingay@cirrusresearch.co.uk

Cirrus Research plc
dedicated to noise measurement

Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH
United Kingdom
Tel: 0845 23 0 2434 (Local Rate UK Only)
+44 (0) 1723 891655
Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk