

Machine safety

Following last year's update of the Machinery Directive, Laura Cork uncovers concerns and confusion over safety-related issues – for machine builders, specifiers and users



"Watch out," warns Paul Laidler, managing director of Laidler Associates

The latest revision of the European Machinery Directive contained the most significant changes since its introduction nearly two decades ago. So says Paul Laidler, managing director of industrial safety validation authority Laidler Associates, a division of TÜV SUD Product Service. And he notes that issues raised affect machine buyers and suppliers, but also users.

The directive specifies what steps machine tool builders, their agents and others must take to assure national authorities that a machine is safe and can be sold within the EU. Originally entering force in the UK back in 1993 (with all machinery supplied in the EU after 1 January 1995 requiring a CE mark), its latest iteration is the Machinery Directive 2006/42/EC, published on 9 June 2006 and applicable since 29 December 2009.

But a little over 12 months later, there are still some serious issues and confusions, and Laidler is warning machine users throughout industry – including plant managers – to watch out.

First, he points out that the scope of the directive has changed – for example, now including partly completed machinery. That addresses the situation where machines might be delivered and recipients told: 'we can't CE mark it, because you haven't put power to it; that's your responsibility'. However, lifting accessories, such as chains, ropes and webbing, must also now carry a CE mark – a point far from

widely adopted yet, according to Laidler. Also, while extensions to exemptions now include all electric motors, hydraulic motors are not excluded from coverage by the Machinery Directive.

Meanwhile, the overarching Essential Health and Safety Requirements (EHSRs) have also been broadened, now including, for example, ergonomics, operating positions, seating and lighting. Further, existing EHSRs have also been modified, taking in guards and protection devices, as well as fixed guards. And make no mistake: what may seem innocuous wording can have a significant impact.

For example, under fixed guards, the phrase 'their fixing systems must remain attached to guards when the guard is removed' will require "every machine manufacturer to redesign his machine", according to Laidler. Also, Technical Files, which demonstrate EHSRs have been met, must now be held by a named person, "who must be established in the European Community". The purpose is to solve earlier problems with traceability of documentation from imported machinery. However, as yet, this, too, is far from universally adopted.

No more excuses

Why is all this emerging now? Laidler explains that initially there was an agreement that, if a machine was in the supply chain prior to the new directive coming into force, the old directive was deemed to apply. "But that excuse is getting rather thin now," says our safety expert.

So much for the detail; but there are also implications at the top level that, to date, have been missed by many. "The original directive says that a machine should be CE marked and compliant for 10 years and, additionally, under the EHSRs for the foreseeable lifetime of the machinery, including assembly and dismantling. The new directive looks at phases of the lifecycle, from transport right through to scrapping. So a manufacturer now has to tell a client how to scrap the machine at its end of life. It's more a cradle-to-grave directive, with new standards supporting this thinking," explains Laidler.

Is it nitpicking? Laidler says not: the directive's aim is to eliminate risk throughout the lifetime of the machinery, with measures also taking in "any reasonably foreseeable misuse". However, the latter indicates a requirement for some serious crystal-ball gazing, particularly on the part of machinery





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And the changes don't stop there. Safety components and safety control systems also come in for attention. First, the new directive is more explicit about what constitutes a safety component. Originally, it amounted to something separately on the market that has a safety function. But the new directive adds two more points, one of which could be a problem. Laidler worries that wording such as "the failure and/or malfunction of which endangers the safety of persons" is open to interpretation. Machine designers are unclear about where the boundary is. Although the new Annexe 5 gives an indicative list of safety, it is just that – indicative.

"Heating and ventilation firms making extraction systems do not CE mark their equipment now, but they will have to," explains Laidler. "Do they know? I don't think so." And he continues: "Guards and protection devices are now safety devices. So replacements, which might have been made by a

local firm, or even in-house, must now be CE marked." Clearly, plant engineers must consider whether a replacement part is a safety component under the new directive.

As for safety systems, the big change concerns software: unlike the previous directive, operating a safety function via software is now allowable. So, access control via chips fitted to humans, which react when electronic barriers are breached, are allowed. And so are Bluetooth-connected E-stops – a prospect that fills Laidler with horror.

However, because of this development, related harmonised standards that support the EHSRs have also seen changes and it is this aspect that is causing most consternation in the industry. The issue concerns EN954-1 and its replacement ISO 13849-1:2006 (Safety of machinery, safety-related parts of control systems: general principles for design), which is used alongside 13849-2:2003 (validation and testing). Machine builders won a two-year stay of

execution on EN954-1, but the date for its demise is December 31, 2011.

The point: EN954-1 was, says Laidler, relatively simple, requiring little validation. But ISO 13849-1 is more complex, calling for the establishment of five Performance Levels (PLs) relating to [a] severity of injury, [b] frequency of event and [c] possibility of avoidance. The issue is calculating these, which requires data relating to the mean time to dangerous failure (MTTFd).

"So, for every piece of safety equipment, its manufacturers will have to provide MTTFd data [or a PL figure], stating that, after so many uses, this product could fail," says Laidler. Back to our guards – and these will now have to be tested to derive MTTFd, while users who incorporate safety parts into a system must similarly validate that the whole safety system meets the required PL.

Again, end users are affected. As our safety expert puts it, if EN954-1 can be considered an MOT (a snapshot of safety), then ISO 13849 is more akin to manufacturers' advice, such as 'change the cam belt at 60,000 miles'. It takes into account the lifecycle of the machine and effectively puts the onus on the user to make sure that a machine's safety systems remain safe.

Expensive errors

And errors can be expensive. Laidler was called in to validate a machine as safe. A manufacturer had carried out a 13849-1 assessment, chosen a performance level and then installed the machine without validation. Laidler demonstrated that the method employed didn't achieve the required performance level, because the software used did not have MTTFd data. The installer had to remove the new circuitry and start again, at additional cost.

That affected the manufacturer, but end users have a legal interest in obtaining proof of safety, too. That's because of regulation 10 of PUWER 98 (Provision and Use of Work Equipment Regulations), which was also updated a few years ago. Before, PUWER required that the buyer made sure machinery had a CE mark; now, however, buyers must ensure that machines meet all the EHSRs of the relevant directives. This will result in end users actively looking for references to ISO13849-1 in machine supplier documentation.

Further, under PUWER 98, regulation 18, regarding control circuits, from 31 December all user assessments must also be to the ISO13849-1 standard. AS HSE documentation puts it: 'There are national, European and international standards, both current and in preparation (BS EN 60204-1, BS EN ISO 13849-1:2006), which provide guidance on design of control systems, so as to achieve high levels of performance related to safety. Though they are aimed at new machinery, they may be used as guidance for existing work equipment.'

Training, advice, guidance

- Laidler Associates is running a series of short machinery safety seminars that are free for delegates to attend.

The workshops will be of particular interest to mechanical or electrical engineers involved in specification, design, maintenance or modification of machinery; managers responsible for production, maintenance or design of factory equipment or anyone else connected with specifying and purchasing machinery.

The dates and locations for the next events are: Solihull, Ramada Hotel, 3 May 2011; Fareham, TÜV SÜD Product Service, 7 June 2011; Scotland, tba, 5 July 2011; Bolton, Ramada Hotel, 2 August 2011; Newbury, Ramada Elcott Park, 6 September 2011; Solihull, Ramada Hotel, 1 October 2011; Fareham, TÜV SÜD Product Service, 1 November 2011; Scotland, tba, 6 December 2011. Visit <http://www.laidler.co.uk/events/upcoming/>

- The first of the two SICK Machinery Directive seminars gives attendees a grounding on the directive and safety-related control standards BS EN ISO 13849-1. Participants review the changes in the new directive, key considerations when modifying existing machines, safety control standards EN954 and get an introduction to the application of BS EN ISO 13849-1.

The second seminar provides delegates with a thorough understanding of applying BS EN 13849-1, and delivers a practical and informal approach to understanding and implementing the key elements of the latest safety-related control standards. Visit www.sick.co.uk

- Procter Guarding website has numerous relevant downloadable documents at www.machinesafety.co.uk

- Leuze Electronic's machine safety inspection service is explained in a 12-page brochure. Its safety inspection service is like an MOT of a machine's safety, along with a description of the company's machine safety devices and support services. Visit <http://bit.ly/cKwbl4>

- A new book from BSI British Standards - Risk Management of Machinery and Work Equipment – offers guidance on and an explanation of: Supply of Machinery (Safety) Regulations 2008; Machinery Directive 2006/42/EC; Provision and Use of Work Equipment Regulations 1998; Harmonised standards, including BS EN ISO 13849. Visit <http://shop.bsigroup.com/bip2184>.

- Machinery safety specialist Pilz Automation Technology is running machinery safety training courses during 2011.

As well as a training course introduced last year on the new Machinery Directive, others available include one-, two- and four-day City & Guilds Machinery Safety Courses; Safety Design incorporating ISO 13849/IEC 62061; CE Marking & Machinery Regulations; and Electrical Machine Safety in Industrial Installations. Visit www.pilz.co.uk/training.

And BSI offers this: 'Although there is no link between 'harmonised standards' and the requirements of PUWER 98, it is necessary for users of machinery to establish that it is safe for use in their workplace. This can involve demonstrating that relevant EHSRs of the Machinery Directive (and any other relevant directives) have been fulfilled by, for example, ensuring that machinery has been designed in accordance with harmonised standards.'

Second-hand machinery is also affected, it is suggested, simply because it requires a PUWER assessment, since the machine's location has changed. And, according to CE safety specialist Conformance: "Even though the Supply of Machinery Regulations do not require pre-1995 machines to be CE marked, if they are re-sold then PUWER requires that they meet the same basic requirements as new machines. An employer is therefore prevented from avoiding their obligation ... simply by avoiding purchasing new machines." 

