

Uplifted engineering

The revised Machinery Directive will have a profound effect on operations engineers using just about any type of lifting equipment, whatever the technology. Dr Tom Shelley reports



There is a storm brewing for plant owners, operators and engineers that has to do with the new Machinery Directive (page 24) and its application to lifting equipment. While no designer or supplier of safety-related machinery seems yet to have been prosecuted for breaches of the legislation, which has been in force for more than a year, the situation with plant users looks quite different – with cases relating to workplace accidents hinging on equipment deemed inadequate.

It seems there is an implicit requirement that it is up to plant engineers to make sure that what they are buying and using is not only safe, but also conforms to all the requirements of the directive. And affected lifting equipment includes interchangeable equipment, lifting accessories, chains, ropes, webbing, removable mechanical transmission devices and safety components.

One of the immediate implications is that chains or ropes, for example, must be CE marked. FB Chain does so, with brass plates attached to every metre of forklift truck leaf chain. Each plate is also inscribed with a batch number that relates to its

test certificate. But plant engineers buying from other companies should beware. As FB Chain's Peter Church puts it: "We are seeing more examples of chain entering the UK without any form of batch marking. Historically, every single leaf chain manufacturer supplied chain with its own batch traceability code. These days, very few do."

The point is that, in the absence of proper marking, the user is legally liable, if the chains or ropes he or she purchases do not conform to the Machinery Directive and are linked to an accident. "The bottom line is that users need proof that chains, ropes and webbing have been proof stressed and tested," warns Church.

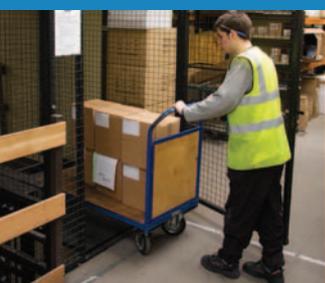


The crucial defence in the event of an accident is the existence of a technical file somewhere, with drawings, if appropriate, to show that parts or finished machinery have been passed fit for purpose. Since that file is so important, it might be wise to find out who holds it. If the

lifting equipment in question comes from the Far East, there could be a problem, if the only copy is in a design office there. Hence the directive's insistence on the technical file being held by an authorised individual in the EC. Either way, it makes sense for the plant user to establish some kind of file.

Beyond that, particularly important to users and maintainers of lifting equipment is a new definition of a 'safety component', which seems to be anything that fulfils a safety function, the failure and/or malfunction of which could endanger the safety of persons. Clearly, that includes interlocks on lifts, but does it extend to gas struts? Examples of items that fall under the scope of the directive's Annex V indicative list include: control devices for calling lifting appliances; anti-fall devices for hoists; safety belts; seat harnesses; and hydraulic non-return valves.

Meanwhile, although most mechanical lifting systems are relatively straightforward, all modern lifts,



Above: Penny Hydraulics' lift
Right: Advance Automated Systems' inclined conveyor system
Above right: Penny's tool bank



for example, depend on electronic controls. Here, the Machinery Directive requires that control systems must be designed and constructed to prevent hazardous situations – and that includes withstanding intended operating stresses and external influences, but also hardware or software faults, errors in the control system logic and foreseeable human error.

Hence, if an excessive load is placed in a lift, it should lock up. But how many maintenance engineers would be able to judge if there might be an error in the controlling software? Remember, if you installed it and/or maintained it, and it goes wrong and kills somebody, it is your fault. Plainly, it is essential to purchase parts from reputable suppliers that can be expected only to supply parts that conform to the regulations – and are, if required, willing to prove it.

And here is another point: one of the requirements of the Machinery Directive, as set out in BS 13849-1 (which replaces BS 954-1 that cannot be used after December 2011), is that parts manufacturers have to be able to supply information on MTTFd (mean time to dangerous failure). So what does that mean for engineering designers – and ultimately maintenance engineers – who have long since been using the SKF handbook, its web-based successors or similar tools from other bearing suppliers to calculate the design life of bearings, for example?



Best practice

Jerome Pommereul, business engineer from SKF's industrial division says it is still fine for lift engineers to use the handbook, but also points out that the company has dedicated application engineers who work with OEM manufacturers. If a site owner or plant engineer is unsure, he says, it is good practice to use the skills available and also to obtain spare parts through their OEM supplier – or ask SKF.

Among other relevant lift components is Mayr Power Transmission's Roba electromagnetic emergency Topstop brakes, designed both for new lifts and also for installation between servo motors and counter flanges in existing constructions. Mayr brakes are all designed to conform with EN 13849-1, as well as EN 951-1, and the company says their MTTFDs are known fairly exactly.

According to Mayr, these units are sealed for life – which should be long, provided the brakes are only used as intended, for emergency braking, and not for regular stopping. Should the brake pads become worn, however, the armature fails to draw across the increased air gap, so the brake won't come off – ensuring a safe failure mode, as per the directive. Hence their long, safe life. Also, because the brake engages in the absence of power, it is



Left: Advance Automated System's vertical conveyor
Below: Mayr top stop brake
Below left: CE marked chain



capable of holding the vertical axis in any position – if a drive motor needs to be removed for maintenance, for example.

Quite apart from the requirements of the Machinery Directive, this is an example of improving safety by design – and Mayr has gone the extra mile here, with a modular assembly that allows a range of approaches. Designs with shafts, for instance, are principally for installation between a servomotor and hollow shaft gearbox. Using one of the brake systems with a hollow shaft and an integrated shaft coupling then eliminates the need for a separate compensation coupling and coupling housing. Also, a driveline with the brake system is only minimally longer than the usual axis with servomotor and shaft coupling, for connection to a spindle or to a gearbox shaft.

Continuing that point, Penny Hydraulics advises that its Mezz lifts confer many safety advantages, compared to using fork lift trucks for reaching mezzanines and upper floors in warehouses. The company's Jocelyn Cole explains that Mezz lifts use two Simplex chains to lift the platform, driven by electrohydraulic motors taking oil from a power pack. Since they lift from the top, unlike a scissor lift, they do not require a floor pit. Further, the power pack is typically mounted to the side of the installation, so they do not require a separate motor room. Also, being fully enclosed and self supporting, they can be relocated fairly easily.

"These hoists fully conform to the requirements of the Machinery Directive," says Cole. Maximum working loads are generally 250–500kg and mini versions are available for loads down to 50kg. Training is straightforward, and maintenance comes as part of a service package that entails two visits per year for inspecting and testing the load-carrying capability and checking oil levels.

Don't forget the obvious alternative for getting materials up to and down from a mezzanine – inclined or vertical conveyors. Advance Automated Systems is one supplier and its systems' main advantage over any lift is throughput. **PE**



Pointers

- The revised Machinery Directive affects everything around lifting, right down to the detail of eyebolts, ropes and chains
- There have so far been no prosecutions of suppliers, but plenty of prosecutions of users of equipment, in the wake of accidents
- However, if users obtain their equipment and parts from reputable suppliers, there should not be any problems