# Safety first

**HSE's review of around 100 serious incidents demonstrates the essentials for ensuring operational safety of everyone on plant. Brian Tinham reports**

When it comes to automated plant, ensuring safety is not just about adherence to the IEC 61508 control system standard or its industry-specific derivatives (IEC 61511 for the process industries, IEC 62061 for machinery etc). It's also about instilling a bullet-proof safety culture and sticking to basic rules. Just as important, we need to understand why people do things that put themselves and others at risk.

That's why the HSE's study into around 100 serious incidents is so valuable. According to Steve Shaw, principal specialist inspector with HSE, its forensic analysis found clear patterns. Speaking at Siemens 'Answers for Industry' conference at Ricoh Arena, he said: "The first thing to note is that there is always more than one cause. The second is that 75% of incidents were within the control of the duty holder. And, of those, 30% could have been prevented, if the plant or machinery had been isolated."

Beyond those, Shaw emphasises the importance of a 'safety culture'. "It is a sad fact that a lot of the incidents could be prevented, if a risk assessment was carried out," he explained. And he gave the example of an incident involving a refuse lorry, which reversed and killed a worker. "It was equipped with a rear-facing CCTV camera, but its field of view was partially obscured. Had a risk assessment been carried out, that would have come to the duty holder's attention."

## Careless culture

For Shaw, the giveaway symptom of a poor safety culture is a lack of supervision and checks. He cited modifications made to automation systems without proper planning, design, installation or validation to ensure they didn't introduce hazards. And he mentioned changes to plant. "It's not uncommon for factory managers to suggest increasing line speed, but that might increase the time taken for a machine to stop. At the very least, you must ensure that operators are trained for a new operating regime. And it's the same when plant is moved: it's important to check reach distances and guarding."

He spoke of one incident involving a large mixing machine and moveable vessel, connected via a flap and hood arrangement, with discharge operations enabled by a latch and proximity switch. When a new vessel type, without a latch, was introduced, the proximity switch was defeated by placing a metal cover over it. "Everything proceeded as normal until one day, following clean-down of the mixing machine, the supervisor looked through the flap and dislodged the metal cover – so the proximity switch closed the flap on him."

But it's not always the operators' fault. "Defeating safeguards is common, but sometimes that's because they're not fit for purpose. They might obstruct the operator's field of view, so he can't run the plant. Also, if guarding means hassle, and the operator is under pressure, he'll find ways around it – and familiarity will mean he won't worry about safety. Another problem we see is fault reports raised, but maintenance failing to act promptly."

However, a big issue remains isolation. Shaw indicates that there is far too great a reliance on interlocks and e-stops. "One operator entered a large shredding machine to solve a problem, believing that the e-stop was enough. But it was faulty – they're not often checked – so the machine restarted and he died. It should have been properly isolated, and that's not just about electrical isolation. It's also important to prevent gravity falls and to ensure there won't be sudden releases of pressure. The best way to improve compliance is to make isolation easy."

Maintenance and fault-finding are the big dangers here. "In one incident, a maintenance engineer climbed into a machine, thinking it had stopped – but it was just in the dwell part of its automatic cycle. In another, an engineer entered a machine, having operated the interlock gate. But the machine restarted, because the interlock had failed.

"It's a separate point, but there should be periodic checks on interlocks and e-stops – which, in our experience, doesn't always happen." PE

## Pointers

- HSE's forensic analysis of 100 serious incidents reveals common threads
- IEC 61508 control systems standard is not enough
- A bullet-proof safety culture and thorough risk assessments are essential
- Understanding why people do what they do is also key
- There is almost always more than one cause
- 75% of incidents are within the control of the duty holder
- Interlocks, e-stops and guarding are not enough: always use proper isolation

**Centre: Steve Shaw, principal specialist inspector with the HSE**