

FORENSIC ENGINEERING

Failure is simply the opportunity to begin again, this time more intelligently.

Henry Ford

Magnet cranes and mindsets

A few years ago, I was engaged by a business unit of a heavy engineering processing company to help them upgrade their safety systems. This followed an accident involving one of the many magnet cranes the company operated.

The magnet crane dropped its load at the wrong time and badly injured some workers. The individuals involved, together with their company divisions were blamed. They had disobeyed procedures and ventured under the working magnet crane when it was operating.

After the business unit's safety systems had been successfully upgraded to the group's new safety system template, I was given the task of reviewing the operation of some magnet cranes, including subjecting each of them to a new Safe Working Load (SWL) test.

I contacted the original manufacturer of one magnet crane who advised that there isn't a meaningful Safe Working Load (SWL) value, which can be prescribed to any magnet crane. For the magnet crane that his company manufactured, it could be anything from 80kg to 80,000kg depending on a range of physical and engineering factors, which couldn't be relied upon. These are factors like the physical geometry, which is presented to the magnet, and a host of electrical parameters.



Andrew McGregor

They had disobeyed procedures and ventured under the working magnet crane when it was operating.

Another problem is that NZ crane law requires a SWL sign to be displayed on every crane, which the company complied with. The crane inspector also believed in the notion of SWL, at least for the supporting structure. Technically, he was correct, but what misleading message could the word "SAFE" have conveyed to the crane users?

Could it have given them a false impression that its ability to retain a load could be relied upon and in doing so generated a mindset that fooled the workers into a false sense of security?

They did disobey instructions but were also entitled to believe the Safe Working Load sign?

Perhaps two signs were needed; one that related to the supporting structure and the other to the magnet-lifting device. The SWL sign for the magnet-lifting device might read next to zero.

But this was more than a mere signage issue. After explaining the difficulty of ascribing a Safe Working Load value to a magnet crane, some fellow engineers and managers still wanted to test the lifting ability of the magnet crane, which injured the workers, even though it appeared to be functioning normally.

Clearly, they had succumbed to a mindset, supported by the law, that a magnet crane should be like a conventional working crane and possess a meaningful Safe Working Load value that could be relied upon.

By Andrew McGregor

FORENSICS

It seemed unfortunate that the safety system template, to which the business unit had recently been upgraded, didn't help to address or challenge the incorrect mindset, which had formed in the minds of many staff.

Mindsets are very powerful; once formed they can lodge themselves deep in the unconscious and may be difficult to budge.

One of the reasons why Flight TE 901 crashed into Erebus was because the pilots developed an incorrect mindset that they were flying down McMurdo Sound instead of flying towards Erebus, which they crashed into in broad daylight and sunshine. They interpreted all the visual cues around them with respect to their incorrect mindset, not their true position.

We need to be mindful of the power of incorrect mindsets, and understand how the misapplication of established systems can help to form them.

Andrew McGregor is a consulting mechanical engineer, commercial pilot and air accident investigator. He owns and directs Prosolvo Ltd, a forensic engineering practice based in Auckland.