High integrity braking solutions

We have a look at the latest innovations in braking systems for lifts, hoists and cranes, with an emphasis on absolute safety and integrity.

Forget what you’ve seen in Hollywood disaster movies. Mile for mile, the elevator is far and away the safest means of getting from A to B. Much of that enviable safety record comes from innovative and effective braking technologies. An elevator safety brake was first patented by Elisha Graves Otis in the early 1850s, and in 1853 he demonstrated how the device could prevent falling in the event of a breakage in the supporting cable, trialling the safety brake on a freight elevator.

The invention paved the way for the introduction of electric elevators, ousting the hydraulic cranes that had formed the mainstay of lift technologies until then. Elevator technology has of course moved on in leaps and bounds, but so too has brake technology.

Vertical movement of loads introduces unique and varying requirements for brake safety and integrity. Specialist manufacturer INTORQ has a range of answers for elevator brake safety and integrity. INTORQ have three concepts for increased safety.

A simple option is to duplicate the braking with a double brake – effectively two brakes piggy-backed together into one assembly. These are available starting at 2 x 4Nm and extending to 2 x 1800Nm. Both brakes are normally used together, so in the unlikely event of a catastrophic failure to one of them, 50% of the torque remains. Microswitches can be fitted to monitor correct brake operation and therefore to signal a fault.

The next option is to supply a single brake that is modified with two internal circuits. The modifications are made to both the mechanical structure and the electrical circuit. Torques range from 15 to 900Nm and the BFK454 brake range meets the requirements of TRA 200 and EN-81 for hoists. Such dual circuit brakes with their redundant braking feature are also used in personnel lifts.

Caliper brakes are also a useful option where redundant braking is required. For example, if four calipers are enough to generate the emergency torque required, additions of just one more can give safe operation should a caliper fail. Microswitch monitoring will detect the failure and shut down operation. INTORQ offers caliper brakes suit/dis/s of diameter 20 up to 500mm with thrusts from 1200 to 8000N. Overexcitation of the DC brake coils is used for reliable release with large running air gaps.

INTORQ solutions for lifts, hoists and cranes are adaptable to meet the safety needs of individual applications. The full range of spring applied brakes covers torques from 0.1 to 2400 Nm and is available in the UK through Techdrives.

Another company with a full range of braking solutions for the lift industry is KEB. Its COMBISTOP electro magnetic brakes combine innovative technology with robust mechanics to meet the needs of EN 81-1 Section 12.4.2 in a high torque density, low noise design. The products offer high vibration and shock resistance for all components, with easy installation due to factory presetting and flexible options for installation. A fail-safe design is assured, with redundant springs providing true power-off braking. Micro switches can be included for function control, and a range of accessories is available including special connectors.

A further innovation for elevator brakes is release monitoring. This prevents unperm itted operating conditions such as for example starting up against a closed brake. Mayr Power Transmission, an international leader in safety brakes for passenger elevators, now provides a contactless system with a proximity sensor for its elevator brakes as an alternative to the tried and tested release monitoring system with microswitches.

As there are no mechanical parts involved, the lifetime of this new, contactless release monitoring system is not dependent on the switching frequency. The system is magnetic field resistant and works absolutely reliably and wear-free. It is also resistant to impacts and vibration, as there are no movable parts, and the electronics are completely encapsulated. Other advantages of the proximity sensor are the high switching point repetitive accuracy, the low hysteresis and the low temperature drift.

The switching bolt for the proximity sensor is installed at the factory and is, in contrast to the release monitoring system with microswitch, not adjustable. Application errors through adjustment of the switching point position are eliminated. This also plays an important role in maximising functional and operating safety.

The contactless release monitoring system can be designed as an NO or NC contact. With the NC contact, the ‘high’ signal is generated if the brake is switched when de-energised. Here the armature disk drops and the brake closes. Any breakage of the sensor cable is recognised when the brake is closed.

With the NO contact function, the ‘high’ signal is generated if the brake is energised and the armature disk releases the rotor, and the brake is released. Only on generation of the ‘high’ signal is the motor enabled for start-up. This reliably prevents the motor starting up against a closed brake. Cable breakage is recognised when the brake is open.

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