

Emergency Rescue Operation of MRL Elevators

by PVN Marar

The introduction of machine-room-less (MRL) elevators is one of the major modern-day achievements and technological innovations in the elevator and escalator industry. As far as buyers, building owners and the architects are concerned, they save the costs of constructing machine rooms. They also can have better elevation and aesthetics by eliminating unwanted projection on the structure. It is a different matter whether any floor space is actually saved by abolishing the machine room, as larger hoistways are required. Another drawback is that MRL elevators generate more sound in the lobby than lift machines placed in machine rooms. With their controllers mounted on the top terminal floor, there are issues that MRL unit controls can be accessed by even casual passersby. The locking arrangements for such controllers are flimsy and, in some cases, no different from standard door locks. This is in contrast to the machine-room arrangement, in which the person would need to first access the terrace, then the machine room. Another aspect is that primary maintenance always has to happen from the top floor. Even if the machine is oil free, permanent-magnet maintenance is required.

However, the overriding issue is the hazards involved with rescuing entrapped passengers, particularly in India where power failures are frequent, adding to prolonged load shedding. When emergency rescue operations are carried out by the

building security personnel or other unqualified persons, the hazard increases dramatically. A closer look at the various models of MRL elevators available in the market indicates four basic approaches:

- ◆ Approach 1: By an automatic rescue device, which will bring the elevator to the nearest floor, depending on the load condition in lift car.
- ◆ Approach 2: The battery backup arrangement is to operate a brake solenoid and thus open the brake arm, which allows the lift car to move up or down, depending upon load condition in the car.
- ◆ Approach 3: One end of a cord is attached to the brake arm and the other to a lever provided in the controller outside the shaft. When the lever is activated the brake opens up and allows the car to move up or down depending upon the load in the car.
- ◆ Approach 4: Where the machine is placed at the bottom terminal landing inside the shaft, the brake release arrangement is located below the terminal landing sill. The rescue is performed with the door kept open and using a lever.

While the first two approaches are undoubtedly the safest methods, the question is, "What happens when the battery has discharged or is too weak to undertake the necessary action?" The approach suggested by one manufacturer involves using a chain pulley block for rescue when the battery does not work. This is not practical in terms of the time

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necessary. Suppliers should find out whether it is possible to induct the battery output in their safety circuit so that the lift will not operate in case the battery strength is low. The second option is to have a battery self monitor to periodically test battery strength, and sound an alarm and pulse an LED before battery power approaches an unacceptably low level, malfunction or discharge, as does a household inverter.

The assumption for approaches 2-4 is that the car and the counter-weight will not be in a balanced state. I have had personal experiences where both have been balanced, requiring ingenuity to rescue those trapped. Approaches 2-4 also require the rescuer to open the controller to access the devices, which can have other implications, considering that most rescue operations are not performed by lift people


Approach 2 which depends on inching, involves moving the car in jerks, which can be very uncomfortable to an already traumatized passenger. Approach 4 is very hazardous to the rescuer, who would be moving the car with the door open. We have recommended creation of a

barricade which, while keeping the door open, would also ensure that the rescuer is comfortably outside the hoistway. This was accepted by the manufacturer after extensive demonstrations and discussions.

With approaches 3-4 (and with most MRL solutions involving gear-less machines), there is the possibility of a runaway car. If the brake-arm releasing lever is fully actuated for a long time, there is a chance for the lift to gain momentum, causing uncontrolled movement of the car, resulting in it overshooting the terminal landings and hitting the buffer, shaft roof, machine, etc. The brake-opening mechanism restricting an uncontrolled movement of the car can eliminate the risk factor, which needs to be probed.

Many of the manufacturers also do not have any indication of floor position, which makes the process even more difficult. All these issues' consequences become more intense when we consider that the rescue operation is being carried out by a non-elevator person. In "The Rescue Operation" by Bruno Ciborra in the March/April 2008 issue of *Elevator*, the author emphasizes the need for

clear instruction, signage and training of all personnel required for a safe evacuation of entrapped passengers. In other words, these requirements should not be obligatory to satisfy statutory compliance.

All products will keep changing. These innovations are necessary for the industry as well as equipment users, but not at any cost. It is essential to recognize the importance of rescue operation, which is to be considered as indispensable as the safety circuit of an elevator system. In this context, it is imperative that all MRL manufactures and suppliers set aside the patent issue and come together to evolve uniformity, at least in the placement of machines and the rescue-operation technique, such as what took place in the formulation of the initiative that made a similarity in the unlocking device keys of most elevators' hoistway doors. While adopting a safe approach, it is essential that it is kept in mind that in India, almost all emergency rescue operations are not done by elevator people. A design that might work and is accepted elsewhere in the world might not be adequate in the typical Indian situation. 

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