The Premier Magazine for the Building Transportation Industry in India

# ELEVATOR WORLD India

Issue 2, Volume 3

www.elevatorworldindia.com

**Cover:** Otis in India

IEE Expo Coverage

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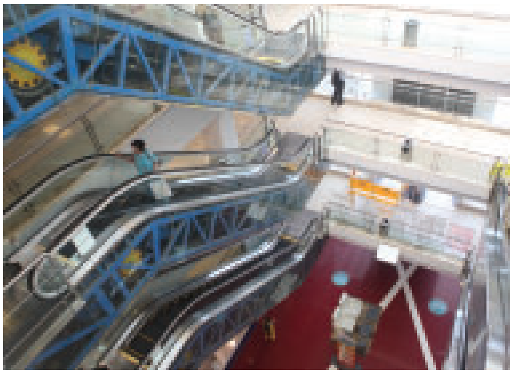
2nd Quarter
Issue 2, Volume 3
2010



## FEATURES:



## DEPARTMENTS:



## COLUMNS:



ELEVATOR WORLD India

ELEVATOR WORLD India

**ELEVATOR WORLD India** is a quarterly magazine published by Elevator World Inc., Mobile, Alabama (U.S.) and Virgo Publications, Bangalore (India). Virgo Publications is a sister organization of Virgo Communications, the organizers for IEE – International Elevator & Escalator Expo. Elevator World, Inc. is the premier publisher for the international building transportation industry. Since the inception of ELEVATOR WORLD magazine in 1953, the company has expanded core products to include ELEVATOR WORLD India, an extensive network of websites, a bi-weekly e-mail newsletter (Elenet®) and the Source©, the most inclusive industry directory.

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**International Publishing Co. –** Elevator World, Inc.
**Indian Publishing Co. –** Virgo Publications

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**ELEVATOR WORLD India** is published in the interest of the members of the elevator industry in India, to improve communication within that industry and to further continuing education of members of that industry. ELEVATOR WORLD India publishes articles by contributing authors as a stimulus to thinking and not directives. ELEVATOR WORLD India publishes this material without accepting responsibility for its absolute accuracy, but with hopes that the vast majority of it will have validity for the field. The ideas expressed therein should be tempered by recognized elevator engineering practices, standards, codes and guidelines. Publication of any article or advertisement should not be deemed as an endorsement by ELEVATOR WORLD India, ELEVATOR WORLD, the publishers at Elevator World Inc. or Virgo Publications.
Printed by Sri Sudhindra Offset Process, No.27-28, 8th cross, Malleshwaram, Bangalore - 560003, Karnataka, INDIA.
**ELEVATOR WORLD India** will be published quarterly in 2010: February 1, May 14, August 16 and November 15.
Advertising and subscription information is available at **elevatorworldindia.com.**

# Editor's Overview

## An Essential Tool

by Robert S. Caporale, MSc

This month's issue of ELEVATOR WORLD India covers a broad range of topics that includes reports on industry events, equipment design and application, and regional and international news. Our cover story by Sameer Joshi describes the Otis Elevator Co. operation throughout India and provides a brief history of the company, along with an update on one of its major projects.

A report on the International Elevator and Escalator (IEE) Expo 2010 by Prabodh Hamilton describes all of the activities that were included in the event. In addition to numerous exhibit stands at which the event's attendees were able to view and discuss the industry's latest products and services, an extensive technical conference was held. And as reported by Snehal Toralkar, a workshop on the use of elevators in fire emergencies was also organized and hosted by TAK Mathews. EWI readers will see that this important workshop was a highlight of this year's major Indian elevator industry event.

Sergio Biglino's article describes the design and testing requirements for fire-resistant lift entrances. Samson Rajan Babu continued this theme with an extensive report on how best to design elevator systems so they can better resist the ravages of fire emergencies and remain operational for firefighters during these events. These articles are essential reading for our industry.

*Continued*

ELEVATOR WORLD
Magazine

In **print** or **digital** format ELEVATOR WORLD is the premier publication for the international building transportation industry!

Subscribers receive 12 monthly issues loaded with relevant and accurate industry information including elevator/escalator maintenance, education, engineering, legal issues, new technology, safety, history, modernization and much, much more. Exactly the same as the print, you can now get your magazine in a digital version e-mailed to your computer the first of every month for ONLY US$25.00!
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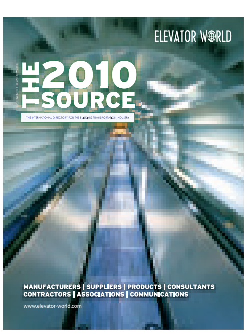


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The report on the theory, design and application of AC permanent-magnet machines is provided by Gary Ward and Palvinder Hayer, and this article is an educational piece for elevator equipment designers and maintenance technicians. Continuing our mission to provide a diverse spectrum of important information to the Indian elevator industry, we offer this issue of EW India for all to study and enjoy. We are grateful to the elevator industry and to our Indian publishing and editorial partners who continue to assist us in making EW India what we feel is an essential tool for the elevator industry throughout the world.

# EWI SERVICES

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Johnson

# Johnson Lifts & Escalators - made in India!

This is a red-letter day for manufacturing in the country: Johnson is now the only company to manufacture escalators in India.

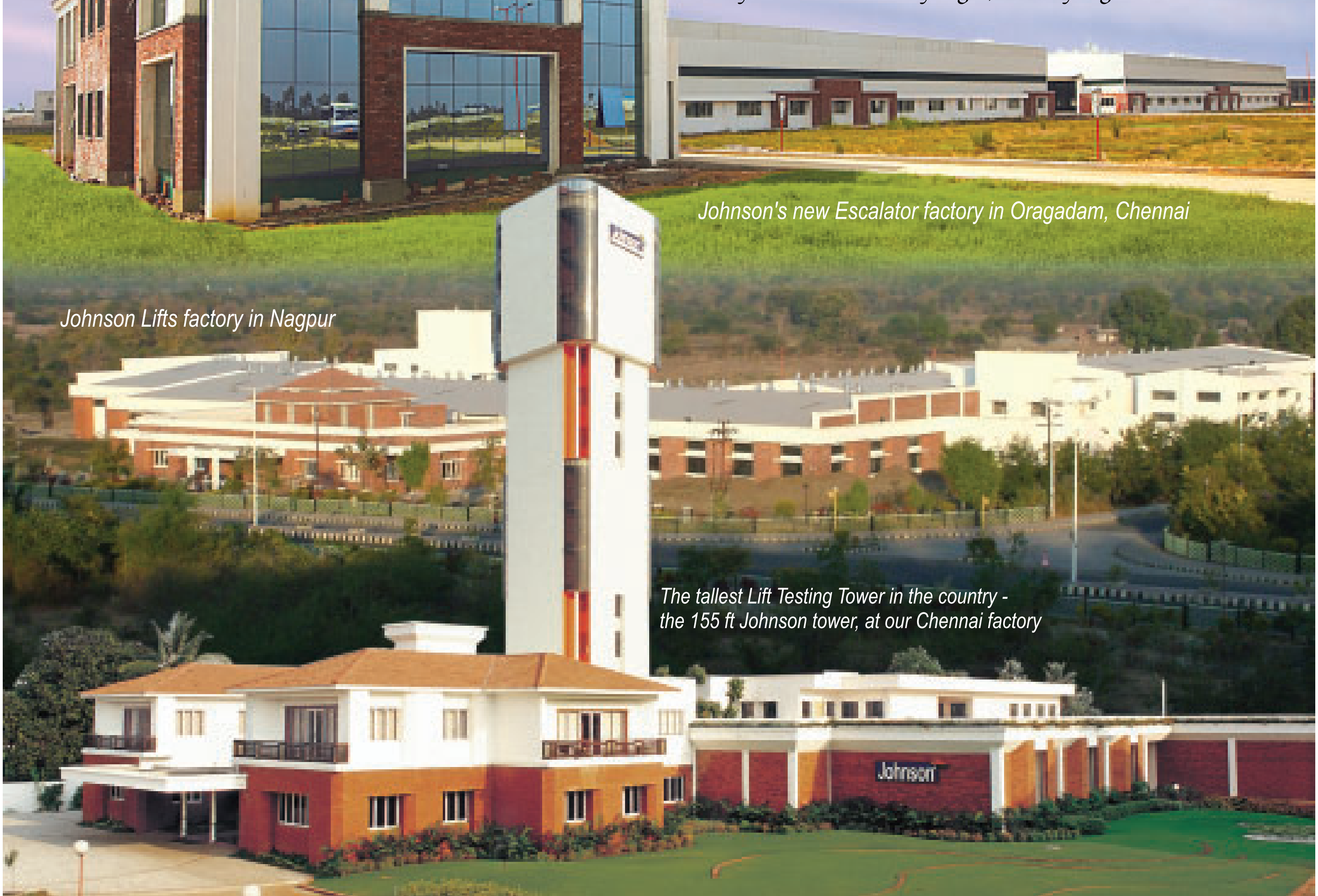
The commercial range of Johnson Escalators are produced at our new state-of-the-art 10,000 sq mtr escalator factory in Oragadam, Chennai.

The technology is from the world-leader in the field, SJEC of China.

Today, Johnson Lifts has unsurpassed manufacturing capacity in the country. We have two full-fledged lift factories strategically located in Nagpur and Chennai. The total built-up area is 28,000 sq mtr with a combined capacity of 7200 units/annum.

The factories are world class in every way: From cutting edge equipment to quality processes. From the skills of our manpower to the brains in R & D.

So you can bet that when you get Johnson, you get the best.




*Johnson's new Escalator factory in Oragadam, Chennai*

*Johnson Lifts factory in Nagpur*

*The tallest Lift Testing Tower in the country - the 155 ft Johnson tower, at our Chennai factory*

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We invite comments from our readers at either the following postal, e-mail or Internet address:

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**editorial@elevator-world.com**

**Website:**
**www.elevatorworldindia.com**

ELEVATOR WORLD India reserves the right to edit comments for length and clarity.

## CONGRATULATIONS

Congratulations to each and every one at ELEVATOR WORLD for the successful launch of the Virtual Elevator Event. It was amazingly thought out and well executed. I wish you all the very best.

*Anitha Raghunath*
*Convener – Exhibitions*
*Virgo Communications & Exhibitions (P) Ltd.*
*Bangalore, India*
*anitha@virgo-comm.com*

## ERRATA ON "RAMBLINGS OF AN OLDTIMER"

In K. Subramaniam's article entitled "Ramblings from an Oldtimer" that ran in ELEVATOR WORLD India, First Quarter 2010, the following statements were incorrect as published.

On page 56, "It can be equated and compared to the multi-lingual instructions booklets" should have read: "It can*not* be equated and compared to the multi-lingual instructions booklets."

On page 57, "Recently, one manufacturer came out with a machine that used a belt and an asynchronous motor, thus preventing the uncontrolled upward run that cannot be achieved in a PM machine" should have read: "Recently, one manufacturer came out with a machine that used a belt and an asynchronous motor. With an asynchronous motor, preventing the uncontrolled upward run cannot be achieved as is being done in PM machine."

EW India regrets any confusion this may have caused.

## CUTLINE CLARIFICATION

In V.S. Sivakumar's article entitled "Johnson Installs Travelators at Chennai Airport" that ran in ELEVATOR WORLD India, First Quarter 2010, the cutline of the photo ran as "The Johnson Lift factory." EW India would like to clarify that as "Johnson Lifts' escalator factory."

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**interlift 2011**

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  assessed their participation as "very good" or "good", 26% as "satisfactory"
- **76% of the 18,212 visitors**
  rely only on the interlift as their source of information
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  are involved in decisions

* Herbert Dirr, Trade Fair and Congress Consultant, Hamburg

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# Inside India News

## JOHNSON LIFTS RECEIVES AWARD

Johnson Lifts Pvt. Ltd. of Chennai has been awarded the IMC Ramkrishna Bajaj National Quality – Performance Excellence Trophy in the Manufacturing Category for 2009. The award was received by V.M. Thomas, joint managing director of Johnson Lifts, on March 19, from Dr. Ashok S. Ganguly, Padma Vibushan and Member of Parliament, Rajya Sabha. The event was held at Y.B. Chavan Auditorium in Mumbai. The IMC Ramkrishna Bajaj Quality Award (IMC-RBNQA) Trust also honored Mukesh Ambani, chairman and managing director at Reliance Industries Ltd., by presenting him with the IMC Juran Quality Medal for 2009. The winners had been announced by a panel of judges chaired by Deepak Parekh, chairman of HDFC Ltd.

The IMC RBNQA is aligned to the internationally renowned Malcolm Baldrige criteria for business excellence. The award was instituted in 1996 by the IMC RBNQA Trust in order to give recognition to business excellence in organizations. The trust was created to foster the success of the program. Prominent leaders from Indian organizations serve as trustees to ensure that its objectives are accomplished. The members also confirm the selection of winners based on the recommendations of the panel of judges.

The IMC RBNQA is named after the late Shri Ramkrishna Bajaj, former head of the Bajaj Group of companies. Bajaj considered being a part of the nation-building process to be as important as running his business. The award criteria emphasizes openness and transparency in governance and ethics; the need to create value for customers and the applicant's business; the challenges of rapid innovation; and capitalizing on knowledge assets.

Assessment for the award is based on the evaluation of parameters emphasizing excellence in all business practices covering leadership, strategic planning, customer and market focus, measurement, analysis and knowledge management, workforce focus, process management and business performance results.

The award citation states:

> *"[Johnson Lifts] uses its proprietary leadership qualities to integrate and closely monitor all key areas of performance effectively to get the best out of [its] highly motivated employees. Senior leaders demonstrate visionary leadership through example in all key areas."*

## KONE TO INSTALL NEW SYSTEMS

KONE Corp. currently has a strong presence in the Asia-Pacific market and continues to grow annually. Given the demand for newer technology, the company is planning to install destination-controlled software systems to optimize traffic and waiting time. The product will first be introduced in Mumbai with an initial cost 20% higher than that of normal installations, according to KONE's President and CEO Matti Alahuhta.

Alahuhta added that the Asian market is important for KONE business growth because it demonstrates rapid urbanization and demographic change. While the company's annual business growth has been over 10%, the Asia Pacific region has shown more progress, with market share increasing from 11% to 17%. KONE is one of the market leaders in India and has 2,500 employees at its Chennai plant. The south and west are also leading markets, with growing residential business. This increase contributes to the company's growth. KONE currently has seven R&D centers globally with 700 people, 300 of which are located in India. Their current main focus is still on energy-efficient technology.

Continued

# 4th European Lift Congress Heilbronn

## Safety - Sustainability - Technical Innovations

**Conception and Chairman: Dr. Gerhard Schiffner**

## October 19, 2010

*Check in from 8.00 am – Start 9.00 am*

**Welcome** Georg Clauss, TAH eV
Jürgen Schröder, HN University
Luc Rivet, ELA

**Introduction** Gerhard Schiffner, ThyssenKrupp

Beata Pich ● European Commission
**European Directives for Lifts**
Update on Recent Developments

Prof. Anibal T. de Almeida ● Coimbra University
Esfandiar Gharibaan ● KONE International S.A.
**Energy Efficiency of Elevators and Escalators**
Results of E4-project and consequences

Dr. Christian Studer ● Schindler Elevator Ltd
**Adjustable Compensation of Car Load**
High efficient Elevator Drive System

*Lunch break*

Michael Betz ● PE International
**Life Cycle Assessment acc. to ISO 14044**
Environmental Assessment of Lifts

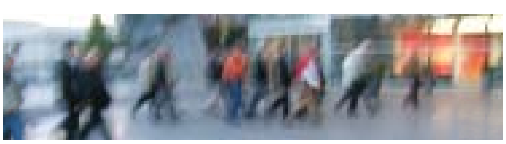
Guy Stamet ● Haus vun der Energie
**Secure Ventilation of Wells and Machine Rooms in Low Energy Buildings**

Dr. Paula Bello ● KONE Corporation
**To a Higher Level**
Industrial Design enhancing Innovation

Gerhard Thumm ● ThyssenKrupp Elevator (CENE)
**Advanced Technology in Lift Control Systems**

*End approx. 4.30 pm*

***Evening Function***



## Accompanying Exhibition

## Information and Registration

Participation fee: 825,- € (VAT free)
incl. brochure, lunch, snacks and evening function

Registration and further Information from now on:
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Verband für Aufzugstechnik VFA-Interlift eV

Verband der technischen Überwachungsvereine VdTÜV

## October 20, 2010

*Start 9.00 am*

Florian Leutner ● Wittur
**New Safety Components against Unintended Movements at Landings with Open Doors**

Ian Jones ● Otis
**Fundamental Revision of EN 81-1/2**
Road Map and Major Modifications

Luciano Faletto ● S.A.L.A. Consulting
**Lift or Machine**
Safety Considerations for Lifts according to Lift Directive or Machinery Directive

Takaharu Ueda ● Mitsubishi Electric Europe
**Efficient and Safe Emergency Stopping**
New Brake System for Traction Lifts

*Lunch break*

Holger Zerelles ● ThyssenKrupp Aufzugswerke
**How Safe are Safety Spaces?**
Permanent and Temporary Spaces, Pros and Cons

Lars Odlen ● Safeline Europe
**Challenges in Remote Alarm Systems Brought by Regulations and Technology**

Monika Klenovec ● Architect and Access Consult
**Accessible Europe for All - A Reality in 2010?**
New UN-Convention and Implementation in Europe

**Summary and Closure** ● Gerhard Schiffner

*End approx. 4.00 pm*

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# Technical Academy of Heilbronn e.V.

**Institute for further Education and Training at Heilbronn University**

## INDIAN RAILWAY STATION UNDERGOES CONSTRUCTION

According to *The Times of India*, the Hubli railway station is undergoing additions and improvements including escalators. In addition, there will be separate and wide exit and entry points. The new building will be on an 8,000-square-meter area with parking facilities. The number of platforms will be increased from four to six once the new building is in place.

## INDUSTRY EQUIPMENT IN HYDERABAD OVERPASSES

Escalators and/or lifts are to be added to pedestrian overpasses in Hyderabad. Such work has already commenced at the LV Prasad Eye Hospital on Road No. 2, Banjara Hills; Rasoolpura; and Dilsukhnagar near Hanuman Temple. Future equipment installations are to take place at the Hyderabad Public School, Begumpet; St. Anns School, Secunderabad; RS Brothers at Ameerpet; and at the Khairatabad junction. Private advertising companies, to which the overpasses are leased, are reportedly constructing and installing the equipment. Operation and maintenance will also be handled by them for six to 20 years.

## COMPANY OPENS NEW OFFICE IN MUMBAI

Interfleet Technology (India) Pvt. Ltd. an international consultancy firm of the rail industry, has announced the opening of its first office in India. The new office will provide answers from training and environmental issues to railway operations and infrastructure. Interfleet is currently providing quality-assurance services for the manufacture of metro vehicles for the Mumbai Metro project. The firm is also involved with the Delhi Airport Metro project.

Ramteke

Amit Ramteke will serve as regional manager of the new office. He commented:

> *"The industry is well supported by the government, and there are a number of projects currently being implemented. Several metro schemes are at different stages of development, and a monorail market is also emerging."*

Inside India News

Send to the editor: P.O. Box 6507, Mobile, AL 36660; fax: (1) 251-479-7043; or e-mail: editorial@elevator-world.com

## EEST AT IEE EXPO

The Elevator Escalator Safety Trust (EEST) put up a stall at the International Elevator and Escalator Expo (IEE Expo) 2010 and managed to reach a large audience. While a number of companies have affirmed that the Trust's initiative is the need of the moment in India, EEST Founding Trustee TAK Matthews reports that no donations are being received. This is hampering the Trust's activities.


On March 11, Mathews was interviewed by the income authorities to establish a justification for the tax exemption application put forth by EEST. It is expected that the tax waiver certificate will be received by June. Interestingly, one of the questions the commissioner asked Mathews was why the Indian elevator industry had not done anything so far in this direction.

## MAN DIES FROM ELEVATOR ACCIDENT

A 25-year-old man died as a result of an elevator accident in Udaipur on February 23. According to a report from 24dunia.com, the man was trying to see when the elevator was going up and was struck by the elevator. Another passenger was injured when he tried to help the man.

## DELHI STADIUM STATION TO GET ESCALATORS

The Delhi Metro Rail Corp. is renovating its Jawaharlal Nehru Stadium station in preparation of the Commonwealth Games 2010's opening and closing ceremonies at the stadium. Part of the project is the installation of four escalators that will connect the concourse with the stadium. This would help the station cater to 4,000 passengers per minute in peak times. It has been designed to accommodate a total traffic flow of 80,000 persons per hour, with a platform area of 1,800 $m^2$. The Delhi Metro will provide connectivity to 10 out of 11 venues of the Commonwealth Games, to be held on October 3-14. Volunteers at the station will be assisting passengers at important traffic points, including the tops and bottoms of escalators.

## CHOICE MARINA WITH GREEN TECHNOLOGY UNDERWAY

New York-based architecture and interior-design firm CetraRuddy announced in February that it had broken ground on Choice Marina, a high-rise residential resort condominium property in Cochin, a port city in Kerala. Dubbed Choice Marina, the waterfront project is being developed by the Indian company Choice Group.

With 138,000 sq. ft. of total area, the 13-story complex consists of two towers connected by core and service areas. Private elevators are included in the luxury amenities, including a rooftop lounge and pool. Half of the condo's units were sold at a total of US$16 million during an exclusive launch event at the site in December 2009.

The building has been designed for maximum energy efficiency and sustainability. To respond to the tropical climate, the towers are sited and oriented to reduce solar-heat gain and minimize the impact of monsoons without compromising views. Each tower will bear an array of fixed and operable exterior screening and sun-shading devices to enhance the performance of the curtain wall and further improve energy efficiency. Occupancy is slated for July 2011.

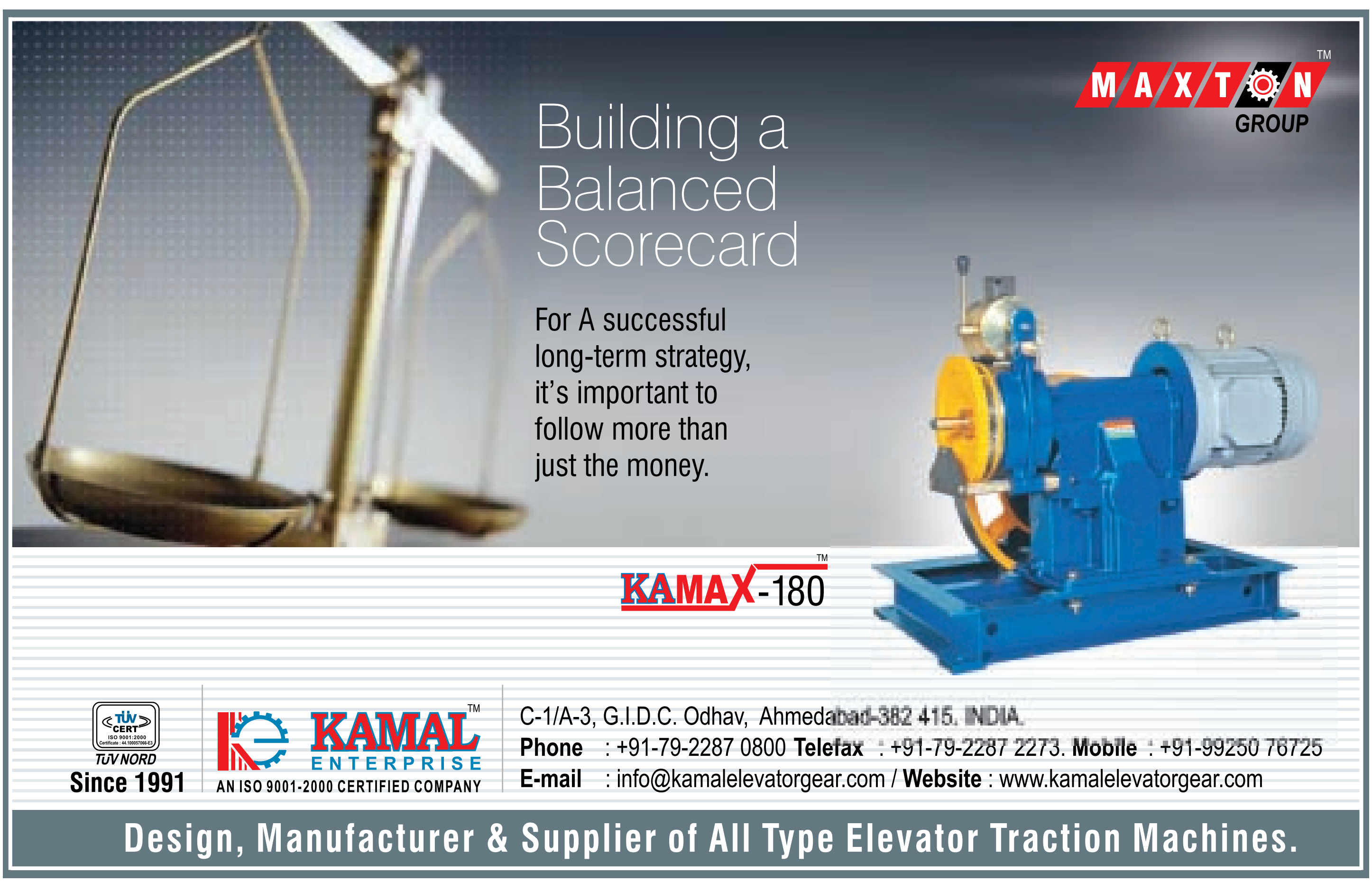
## ENVIRONMENTAL EXCELLENCE AND DEVELOPMENT PROGRAM

KONE discussed its program on environmental excellence and development on February 25, in Chennai. KONE President and CEO Matti Alahuhta was present and commented, "We have created a fully new segment [of] machine-room-less elevators, and have been [one] of the innovation leaders in this segment ever since." According to KONE, buildings consume 40% of the world's energy and elevators account for up to 10% of a building's energy needs. Therefore, the need for sustainability has been recognized and is being innovated in the industry's equipment. The most significant part of a KONE product's life-cycle impact on the environment takes place when the product is used, not during its manufacture.

Neeraj Sharma, managing director of KONE Elevator India Pvt. Ltd., added:

> *"We have also been pioneering regenerative solutions that can recover up to 35% of the total energy consumed by elevators. Through our technological capabilities, we have been able to regenerate power back to the owner's supply network and reuse it to power other equipment in the building."*

Continued



## SNAKES ON AN ESCALATOR

V. Jagannathan recently notified ELEVATOR WORLD India of a python inside of a Mangalore escalator. The napping creature had apparently slept through six other complete escalator installations on the premises. "Snake catchers" were organized to carefully extract the 10-foot-long reptile. Fortunately, no one was hurt, and the snake was released back into its nearby jungle home.

## MAN DIES IN MUMBAI HOTEL ACCIDENT

A 61-year-old Bhopal man died from injuries he sustained when he fell in an elevator hoistway at a Mumbai hotel on February 26. According to the *Indian Express*, the man had accompanied an injured friend to Mumbai to assist him with a hospital visit. While at the hotel, the man entered the hoistway through the open hallway doors on the third floor, but the car was not present at that level. Following an investigation, police found a case of negligence in the operation of the elevator and arrested the hotel owner and manager. According to the report, the manager was responsible for the proper maintenance of the elevator.

## TWO INJURED FROM LIFT FALL

In January, a recently installed elevator fell in a Surat building, injuring two people. Four passengers entered the elevator, and as it reached the second floor, the doors opened and the lift collapsed into the hollow space below the ground floor. This is the second incident involving this particular lift since its installation in late 2009. Prior to the lift falling, two passengers were trapped in it for four hours when it became stuck.

## ELEVATORS TO TRAVEL 28 STORIES IN 32 SECONDS

According to Mid-day.com, the Municipal Corp. of Delhi (MCD) is expecting to receive some of the fastest elevators in India for its 112-meter-tall building. The civic body (which is presently housed in Chandi Chowk) will move to a new location in Central Delhi. The move date was not scheduled as of press time. The MCD purchased 43 elevators for the project. Fourteen of the 43 elevators will be among the first of their kind in the country and move at speeds up to 3.5 mps. The lifts will also have a capacity of 20 passengers. An additional 14 elevators will move at speeds up to 2.5 mps and also have a 20-passenger lift capacity. The remaining 15 elevators will travel at a speed up to 1.5 mps.

## PROPOSED INCREASE OF FEES IN MUMBAI

According to *DNA India*, a 135% increase in fees for scrutinizing building proposals has been proposed for Mumbai. Brihanmumbai Municipal Corp. (BMC) has put forth the fee that would apply to all construction-related proposals, including those for constructing new buildings, additions or other alterations. Even areas not counted in the floor-space index (FSI) will be included in the charges.

Sunil Mantri, vice president of the Mumbai Chamber of Housing Industry, said that FSI-free components account for 25% of the built-up area: "The cumulative [effect] will be that the scrutiny charges will be effectively doubled."

## HIGH RISES FOR PUNE

According to the *Pune Mirror*, four proposals for high-rise buildings have been submitted to the Pune Municipal Corp. for contruction. Erection of a 100-meter building, named "God's Blessing," has already started in the city's Koregaon Park. The Maharashtra government began allowing skyscrapers with a height between 40 and 100 meters to be built in the city in 2008.

Continued

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## MUMBAI WOMAN DIES AFTER FALLING DOWN HOISTWAY

According to *The Times of India*, a 50-year-old woman died on March 23 as a result of injuries she received after falling down an elevator shaft in a Borivli, Mumbai, building. Though recently serviced, the elevator did not have its car at the third-floor landing when the woman attempted to enter. It was two floors above, and as a result, the woman fell 35 feet down the empty shaft. The case was initially registered as an accident by the police, but it remains under investigation.

## FACTORY GETS CERTIFIED

The Fermator Group factory in India has been certified under the standard UNE-EN-ISO 9001:2008. This certification process reaffirms the company's policy aimed at maintaining quality standards in production and distribution of automatic doors for lifts.

## LIFT ACCIDENT TAKES LIFE OF SIX-YEAR-OLD GIRL

On April 18, a six-year-old girl died as a result of injuries she sustained when she became trapped between the door and the gate of a moving elevator in her residential building in Dharavi. *The Times of India* reported the girl was on her way to church services with her parents and siblings when the incident occurred. According to the report, the girl "ran out of the house and pressed the button for the lift to come up to the fifth floor." Her mother stated she then saw the girl step into the lift, and it began to descend. The father added that the elevator returned to the fifth floor with his daughter "stuck in the doors." She died before fire brigade rescuers could free her. While a case of accidental death was registered, police are investigating the incident to determine if negligence on the part of the operators or maintainers of the equipment played a role in the accident.

## INDIAN GOVERNMENT APPROVED 22-STORY HOSPITAL

According to dnaindia.com, the Ahmedabad state government approved the development of a 22-story specialty hospital near Thaltej in January. The urban development department also approved the project to be in an R2 zone. In the future, it may get converted to an R1 zone, which suggests that high-rise construction can be expected in the region. Once the hospital is complete, it will reportedly be the second-tallest building in the city, next to the Patang hotel on the city's western side.

## NEW MASTER PLAN FOR MANGALORE

The Mangalore Urban Development Authority (MUDA) recently unveiled its new master plan for city development. P.G. Ramesh, commissioner of MUDA, said that the majority of the 30,600 hectares available in the Mangalore local planning area has been earmarked for the total urbanization process. Of this, 11,317.59 hectares (46.66%) has been set aside for residential purposes. Due to recently implemented government regulations, the master plan will consider buildings exceeding 18 meters tall high-rise buildings. MUDA predicts that the master plan will be implemented within two years.

Shankar Bhat, mayor of Mangalore, stated:

> *"The city was just getting over a great slump in the real-estate and construction industry for the last six years, and things have started looking up for it since the beginning of this year. Big builders from Mumbai and Bangalore have started expanding into Mangalore, which is seen as the next engine of growth for Karnataka. Mohtisham of Mumbai, Prestige, Nitesh and Sobha have considerable presence in the city already. One of the largest. . . high-rise apartment buildings was being promoted by a joint venture between Sobha and Prestige group of Bangalore at Derebail. There are many builders who are coming with big money into Mangalore. . ."*

*MUDA presents its new master plan for Mangalore.*

According to *Mangalorean*, regulations have been prompted in part by 47 high-rise buildings in Mangalore having been stamped unsafe and illegal by the Urban Development Department. Additionally, two major fire accidents in high-rise buildings in the last 18 months has opened all multistory buildings for scrutiny by the fire department, which has stated that over 50% of high rises are fire-hazard prone.

**Inside India News**

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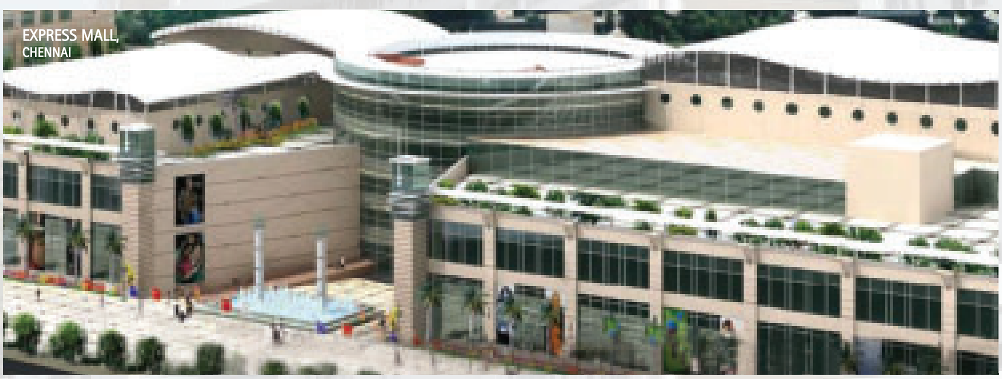


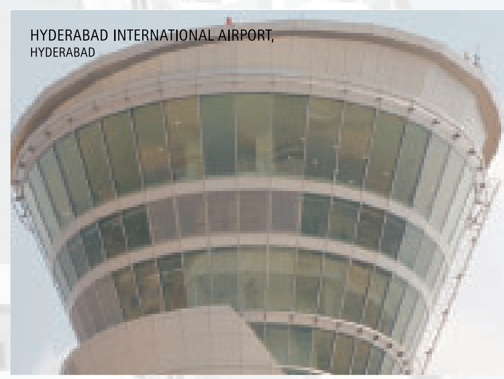


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# Regional Industry News

## Australia

### MELBOURNE HIGH-RISE CONSTRUCTION

Construction on a 67-story building by Tony Brady is scheduled to begin in Melbourne this year. Developer Lorenz Grollo, who owns the 60-story Rialto Towers on Collins Street, also intends to build in the city. In the face of an expanding population, better use of available city land and higher buildings have been recommended to maintain the city's livability and halt its urban sprawl.

## Bangladesh

### PROPOSED HIGH-RISE BUILDINGS

Dhaka City Corp. in Dhaka, has proposed a project to construct 45 15-story buildings at Mohammadpur. After completion, the project will provide permanent housing for 38,667 families. The proposed project plans to build the high rises on 15 acres of land at the Town Hall area and Geneva Camp was discussed at a meeting in March. Dana Media, the organization that made the architectural design of the project, presented various aspects of the project during the same meeting. The project is expected to be complete within four years once construction has started.

### INJURIES FROM LIFT ACCIDENT

Nine athletes from Nepal and an official were injured in January when a lift fell from the third floor in a hotel near the Bangabandhu National Stadium in Dhaka. The capacity of the lift is 10, but 17 passengers got into the elevator cab, according to a hotel assistant manager. The athletes were in Dhaka for the South Asian Games.

## China

### OTIS HONG KONG RECOGNIZED FOR COMMUNITY SERVICE

For the fifth consecutive year, Otis Elevator Co. (H.K.) Ltd. was recognized with a Caring Company Award from the Hong Kong Council of Social Service (HKCSS) for its community service. A Five Consecutive Years logo was also awarded to commemorate the milestone. The Caring Company recognition program, introduced by HKCSS in 2002, seeks to build a caring community by cultivating corporate citizenship and promoting strategic partnerships among business, public and non-profit organizations. To be recognized, companies need to meet three criteria: caring for the community, caring for employees and caring for the environment.

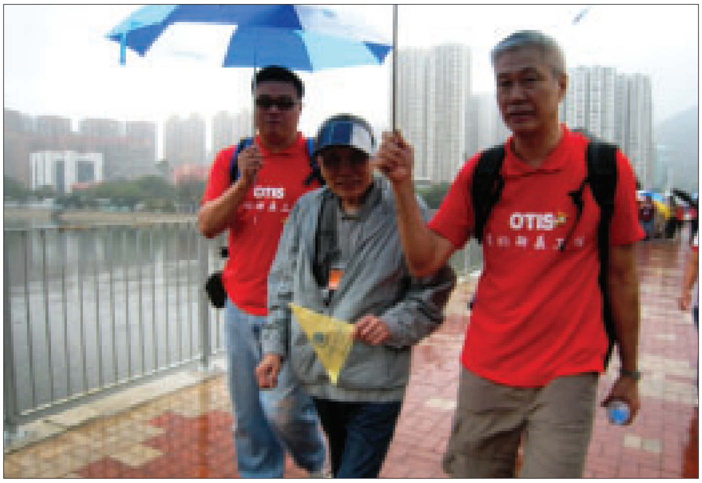
Otis Area Director for Hong Kong and Taiwan Tom Vining stated:

> *"We take great pride in receiving this award yet again as it truly highlights the strong focus we have placed on promoting community involvement among our employees. We have always believed it is our corporate responsibility to give back to the community, especially to those who most need our support. The award and the new logo recognize our success in building a caring corporate culture and the dedication of our employees."*

*Otis employees and newly immigrated children play softball.*

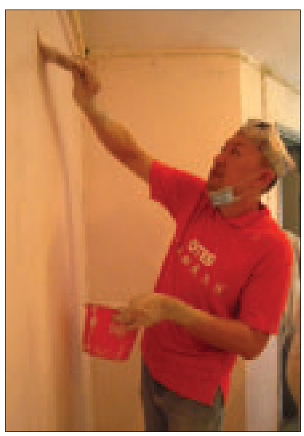
Since 2005, Otis' volunteers have actively pursued and developed community programs targeted at helping the needy and underprivileged. In 2009, its Voluntary Committee organized 10 activities, and more than 370 employees and their families contributed more than 1,180 voluntary hours to assist the elderly and children in need.

In caring for its employees, Otis has taken a proactive approach to offer a range of benefits, which include parental leave, textbook subsidies for employees' children, flexible-work arrangements and special bonuses for employees with newborns. To further extend its care to employees' families, Otis dedicates one day every year for employees to bring their sons and daughters to the office, with the aim of increasing the children's understanding of their parents' work environment.



*Otis employees and the elderly participated in the Hong Kong Christian Service Walkathon 2009 despite a heavy rain.*

The company noted that it invests in research and development to improve performance while safeguarding the environment. In addition, Otis presents its annual "Environment, Health and Safety Day," while the company's environmental management system and processes strive to ensure the proper disposal of polluted materials and minimize its environmental footprint. Otis has also attained ISO 14001 Environmental Protection Management System certification.



*An Otis employee helps a lady with chronic illness paint her house.*

### ELEVATED WALKWAY PROPOSED AT KOWLOON BAY

The government in Hong Kong has published a notice of its plans for an elevated covered walkway system to connect the Mass Transit Railway Kowloon Bay Station with the Kowloon Bay Industrial Area and Telford Gardens. The 550-meter-long walkway system will include escalators, elevators and associated staircases. In addition, the project will involve the modification of a section of Wang Hoi Road near its junction with Sheung Yuet Road. The modification will include a pedestrian crossing, landscaping and drainage works.

Project plans are available for public inspection at several government locations during office hours, including the Central and Western District Office, Kwun Tong District Office and District Lands Office. Anyone wishing to object to the proposed project should write to the Hong Kong Secretary for Transport and Housing at 16/F, Murray Building, Garden Road, Hong Kong on or before March 16.

## Japan

### HITACHI'S 1,080-MPM LIFT

According to *Dvice*, Hitachi is installing a new 1,080-mpm lift in its 698-foot G1Tower in Hitachinaka City. Requiring air-pressure-control technology, the 40.26-mile-per-hour unit has been dubbed "the fastest in the world," though it is only slightly faster than the fastest elevators in the Burj Khalifa. The tower is being constructed by Hitachi specifically for testing elevators. Its construction was expected to be complete in April.

### MITSUBISHI SYSTEM TO SAVE 10% MORE ENERGY

Mitsubishi Electric Corp. announced in January that it has developed a new multi-elevator smart-control technology that can reduce energy consumption by up to 10% compared to current elevator systems. Designed to cut energy costs without sacrificing passenger convenience, the technology is to be included in the company's elevator systems starting this month. Installation will begin with limited models, then gradually extend to others in Mitsubishi's product line.

With this technology, when someone pushes an elevator button, the system selects the elevator that best balances operational efficiency and energy consumption. Selection is based on each elevator's potential energy consumption according to its current location and passenger load. The system also predicts congestion levels throughout the day, performing such operations as prioritizing operational efficiency during peak usage in morning and evening rush hours and at lunchtime, while prioritizing energy efficiency during non-peak hours. In the latter case, the average wait time in a common office building is no more than 1-1.6 seconds longer than the current average wait of 20 seconds. Energy-efficiency parameters can be selected manually, and elevators can also be set to proceed nonstop to the lobby floor to accommodate large crowds during special events.

Continued

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### ELEVATOR RESEARCH TOWER

Hitachi, Ltd. recently announced that it had planned to complete the G1 Tower research tower in April (ELEVATOR WORLD, March 2010). As of March, the tower was still under construction. The 231-meter-tall G1 Tower is an elevator R&D and manufacturing base in Hitachinaka City, Ibaraki and is said to be one of the tallest elevator research facilities in the world. Hitachi will utilize the tower to conduct verification tests with speeds up to 1,080 mpm, in addition to product development targeting some of the world's fastest high-capacity elevators. It will also develop vibration suppression control devices and internal air-pressure adjustment devices to further improve riding comfort during high-speed operations. Hitachi also plans to undertake development of technologies aimed at reducing the space required for elevator shafts and reducing the weight of elevator cars. The tower will also be used to test products for large-scale and high-rise buildings.

Hitachi also plans to complete a 172-meter-tall research tower in Shanghai, which will be one of the tallest of its kind in China. The tower will be used to conduct development aimed at expanding Hitachi's line of high-speed elevators within the Chinese market.

## Kuwait

### PLAN APPROVED FOR RAILWAY NETWORK

The Kuwait Municipality has approved plans for a US$25-billion regional railway network. The commerce ministry's transport department is scheduled to hold meetings within the next few months with other ministries before publishing the first tenders of the project. A number of technical studies such as location of branch stations and manpower numbers for construction still need to be determined before work can begin. The 135-km-long railway line will connect Kuwait and Saudi Arabia, beginning at Sulaibiya and ending in Nuwaiseeb. The commerce ministry has already received approval to appropriate land for the project, which will be finalized on a build-operate-transfer basis.

*Reported by M.J. Mohammad Iqbal.*

**Regional Industry News**

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## Malaysia

### NEW REPORT ON CONSTRUCTION MARKET

Research service Frost & Sullivan has released a new report. "Strategic Analysis of Building Construction Market in Malaysia" looks at the challenges faced by the industry, what drives and restrains the market and its size, plus provides building forecasts. The report analyzes both the residential and nonresidential building construction markets.

The Malaysian construction industry is growing due to commercial and residential projects, industrial and manufacturing facilities, and expanded and additional airports and other transportation hubs in recent years. According to Research and Markets, which includes the report in its latest offerings, "Success in the building construction market largely hinges on participants' ability to integrate solutions..." These solutions include energy efficiency, environmental impact, financial strength, worker skills and technology. For more information, visit website: www.researchandmarkets.com/research/8c1403/strategic_analysis).

## Middle East

### TOSHIBA ELEVATOR TO DOUBLE TURNOVER

At a press conference in Dubai in March, Shunichi Kimura, global president and CEO of Toshiba Elevator and Building Systems Corp., Japan, outlined the company's plans to double its turnover in the Persion Gulf/India region in less than five years. The increase is expected to be driven by strategic expansion in the area facilitated by the U.A.E.'s "strong signs of recovery, as reflected in new contracts won by Toshiba Elevator," wrote *Eye of Dubai*.

Kimura said that Toshiba Elevator expects to garner projects worth over AED300 million (US$81.7 million) in 2010-2011 in Dubai and Abu Dhabi. Several more projects are in the bidding process. Last year, the company completed projects worth over AED100 million (US$27.2 million) in Reem Islands' Marina Square in Abu Dhabi, involving 126 elevators in 13 towers. This year, it received an order worth AED140 million (US$38.1 million) that includes at least 22 high rises in Reem Islands' City of Lights.

Kimura explained:

> *"Toshiba Elevators has been active in the U.A.E. for the past five years and has done quite well, having executed projects worth more than AED300 million (US$81.7 million). . . . We are sure [that] in less than five years, this place will boom again. . . . Our goal is to make Toshiba Elevators one of the top five players globally. In this strategy, the Middle East and India will play a big role."*

Kimura also revealed that talks with a partner in Oman for launching operations there were in their final stages. Additionally, Toshiba Elevators plans to open offices in Saudi Arabia and Qatar with local partners.

## Pakistan

### GOVERNMENT TO ISSUE FINES TO HIGH RISES

According to *The Nation*, as of January, the Punjab government had plans to regularize 160 illegal high-rise plazas in Lahore by issuing fines. This is a major shift in the demolition operation that was launched by the directives of CM Punjab Shahbaz Sharif following the Supreme Court's orders. The fines are proposed to replace the demolition plans. Sources privy to development revealed that the Lahore Development Authority had constituted a committee to regularize the illegal plazas and plans to take stock of the infringements in their construction, in addition to providing recommendations on the imposing fines.

## Philippines

### LARGE PROJECTS PLANNED IN CEBU

In January, SM Prime Holdings Inc. signed an agreement with the City of Cebu to acquire 30 hectares at South Road Properties. According to philstar.com, the developer plans to build a 250,000-square-meter shopping mall and other projects at the site. It is also planning another mall in the northern part of Cebu. SM Prime Holdings President Hans Sy announced at the signing that the South Road project would also include two hotels, high-rise condominium buildings, a 20,000-square-meter convention center, a hospital and educational facilities. He also explained the developers choice of Cebu as the site of the project was due to how the area "is being managed."

The shopping mall is expected to be completed in about two-and-a-half years, followed by the hotels and condominiums, the latter of which will house both residential and commercial units. The remaining buildings will be built later. While plans for the mall in the northern part of the city were not finalized at the signing, it is expected this project will be built in about the same time frame as the South Road mall.

## Saudi Arabia

### SCHINDLER ACQUIRES SAUDI ELEVATOR

Schindler recently announced that it had acquired 100% of the shares of Saudi Elevator Corp. Ltd. The agreement was, however, still subject to the approval of the Saudi Arabian authorities. Schindler remarked of the deal, "The acquisition strengthens the position of the Schindler Group in the Gulf region's largest market."

## Singapore

### OUB TOWER 2 CONSTRUCTION PROGRESSES

Construction of the Overseas Union Bank Centre (OUB) Tower 2 is progressing and should be complete in 2011. The original OUB Tower, completed in 1988, was designed by Japanese architect Kenzo Tange and stands 280 meters high. The OUB Tower 2 is expected to reach 205 meters with 38 stories and will be designed by Paul Tange, Kenzo's son. The whole complex will be renamed One Raffles Place and provide office space. The two towers will be close to each other. The new tower will meet environmental criteria, being Green Mark certified.

Paul Tange said of tower 2:

*"The new tower is very faithful to the proportions of the original tower. The diagonal planes of the new building relate directly to the spacing of the windows in the original OUB Centre, while the triangular peak is exactly the same height as the lower level in the original tower."*

The triangular patterns on the façades give a prism-like effect and make the building seem less regularly shaped than it first appears. This is emphasized by the way the outer façade touches the ground at an acute point and the way the top section of the skyscraper leans towards the complex.

## South Korea

### ELEVATORS IN BUSAN BUILDING

ThyssenKrupp Elevator (Korea) recently signed a contract to supply 42 gearless elevators ranging in speeds from 2.5-5 mps), seven machine-room-less elevators (three with speeds up to 1.5 mps and four with speeds up to 1 mps), and six geared elevators with speeds up to 1.5 mps. The I-Park project located in Marine City, Haeundae, Busan, is composed of three residential towers, with the tallest reaching 72 stories at 292 meters. The project is expected to be complete in 2011 and will be one of the largest buildings in Busan.

Currently considered the tallest building, the Centum City shopping center in Haewoondae, Basan, was also supplied by ThyssenKrupp Elevator (Korea) with 123 pieces of equipment including eight gearless, 20 geared and 11 MRL units; eight moving walks and 76 escalators at the complex.

## Turkey

### SCHINDLER TO SUPPLY ISTANBUL SUBWAY

Schindler announced in February that it is to supply 339 escalators and elevators for a new subway system in Istanbul. According to the company, the 22-kilometer

Continued

Kadikoy-Kartal line will provide a transport axis for the heavily populated Asian half of the city. Signed last year, the contract consists of 272 escalators and 67 elevators.

The units are due to be installed in the 16 stations along the Kadikoy-Kartal line by the end of 2010, before the system is handed over to city authorities at the end of March 2011. The escalators measure 3 to 20 meters in length and are fitted with special materials and features, such as stainless-steel landing platforms and balustrades to provide protection from the elements. Most of those installed indoors have glass balustrades, and some have steel on one side and glass on the other.

The new line is part of a major expansion of the city's public-transport network aimed to ease congestion. Schindler has already supplied escalators for Istanbul's main airport, as well as for stations along another metro line that runs under the Bosphorus.

## United Arab Emirates

### CITY TO FACILITATE TRAFFIC FLOW

The Municipality of Abu Dhabi City has completed the installation of modern elevators at some pedestrian bridges in the main traffic detour areas on Al Salam Street. Elevators were installed on three of the pedestrian bridges, the first near Le Meridian hotel, the second on Road No. 10 between Hamdan Street and Mina Road, and the third near Abu Dhabi mall. The Municipality of Abu Dhabi City also opened a U-turn access at Mina Road. The right lane that links Mina Road with Corniche Road has also been opened to help facilitate traffic in areas affected by construction.

### TOSHIBA ELEVATOR'S PLANS FOR THE GULF REGION

Delegates from Japan's Toshiba Elevator & Building Systems Corp., including President and CEO Shunichi Kimura, recently visited Dubai. Kimura visited many places, in particular, Al Reem Island, Abu Dhabi, where 122 Toshiba elevators are installed.

On March 28, Kimura outlined the company's plans to double its turnover in the Persian Gulf region in less than five years. To be driven by strategic expansion in the Gulf and India, the plan is to take advantage of what Kitamura called the U.A.E.'s "strong signs of recovery." These, he said, are reflected in new contracts won by Toshiba Elevator. Kimura also stated that the company expects to execute projects worth over AED300 million (US$81.7 million) in 2010-2011 in Dubai and Abu Dhabi. Several more local projects are in the bidding process.


*The press conference was attended by the following Toshiba leaders: (l-r) Installation General Manager Mr. Fukazawa; Executive Vice President, Manufacturing and Production, Aoki Kanda; Executive Director, DMCO Royal Group Co. (Toshiba Elevator exclusive distributor for the U.A.E.) Mohamed Iqbal; President and CEO Shunichi Kimura; General Manager, Overseas Operations Katsuhiko Iwasaka; General Manager, DMCO V. Abubacker; and Resident Toshiba Elevator Manager in U.A.E. Mr. Hirayama.*

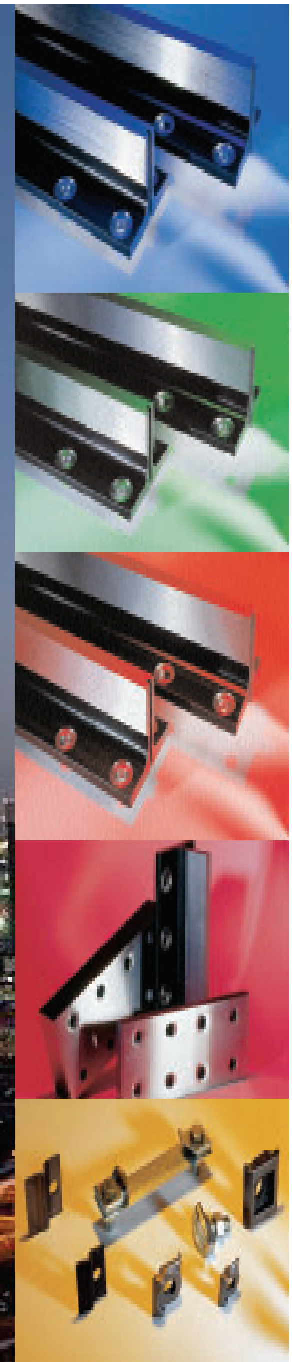
Abu Dhabi has emerged as the key market for Toshiba Elevator. Last year, the company completed projects worth over AED100 million (US$27.2 million) in Reem Islands' Marina Square, involving 126 elevators in 13 towers. So far this year, it has won a new order worth AED140 million (US$38.1 million) in Reem Islands' City of Lights, covering more than 22 towers.

Kimura also revealed that talks with a partner in Oman for launching operations there were in their final stages, and that an announcement would be made very soon. Plans for opening offices in Saudi Arabia and Qatar with local partners have concurrently been made. In India, talks with large industrial houses for a possible partnership are ongoing.


*Toshiba executives meet with the press.*

Kimura explained:

> *"Our goal is to make Toshiba Elevator one of the top five players globally. In this strategy, the Middle East and India will play a big role. The next five years entail a challenge, as well as an opportunity for Toshiba Elevator to make it to the big league among global players."*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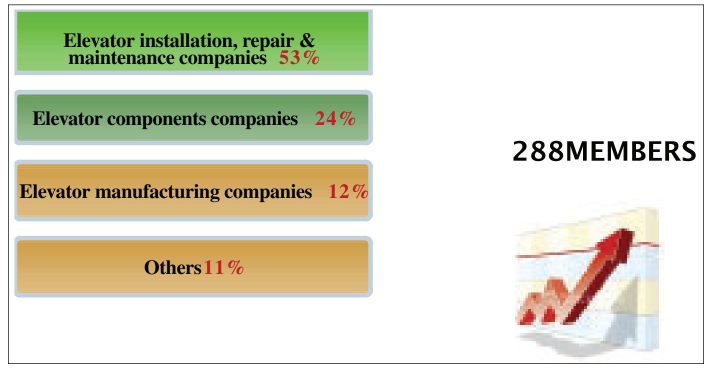
# Focus on Shanghai Association

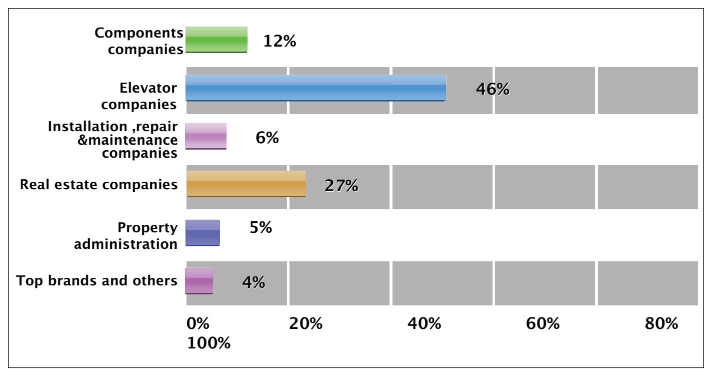
The Shanghai Elevator Trade Association (SETA) was established in August 1988 as Shanghai Elevator Association. In March 2003, it changed its name to the current one. The association now has more than 280 members, including elevator manufacturers, installers, repairers, maintenance companies, universities, colleges, architectural designers, government departments, property administrators and real-estate industry people. The group aims at implementing government rules and regulations, while promoting the development of industry technology and enhancing industry synergy.

As "the bridge between government and [the] elevator industry, and between association members," SETA promotes itself through the *Shanghai Elevator* and *Shanghai Elevator DM* magazines (of which translations into English and Japanese are available), in addition to its website (www.sh-ea.net.cn), which is now in both Chinese and English, and includes a comprehensive component directory. Implementing joint training is another aspect of SETA's work. This training focuses on new elevator technology, products and crafts; elevator installation, repair and maintenance; and supervision qualifications. Its Elevator Experiment Tower furthers this arm of the association's efforts. SETA also aids its members in the connection between related associations and the local chambers of commerce. Group insurance (now covering 58 companies) is yet another service it offers.

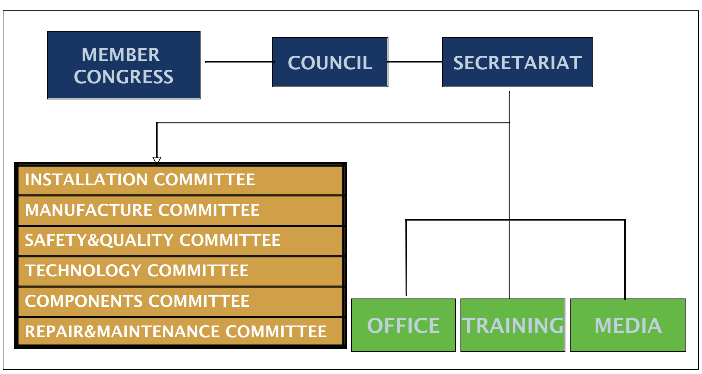
SETA uses evaluation analysis, feedback improvements, customized communication and marketing planning to enhance its service and create more business opportunities for its members. In addition to going overseas to explore business opportunities for its members, the association also organizes its members to participate in international elevator and escalator exhibitions. With a vision to broaden the magazine's readership both domestically and internationally, establish greater cooperation with other elevator associations and jointly develop the industry, SETA has planned to be there for our industry for the long haul.



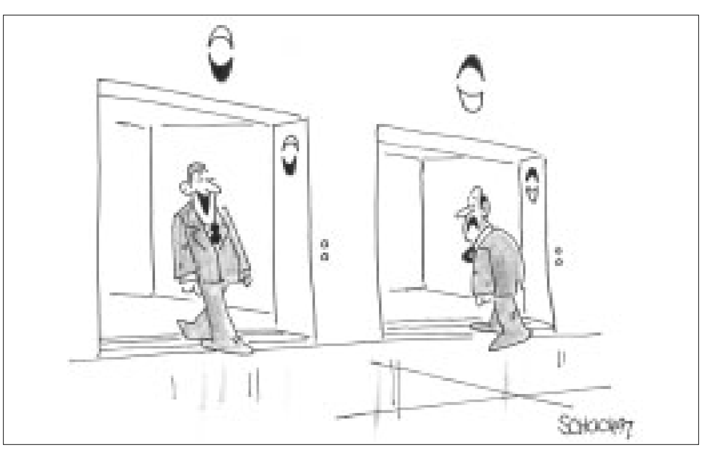

*A breakdown of SETA's current membership*




*A graph of where SETA's magazine reaches*




*How SETA is organized*



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# Hydraulic Elevators – Busting the Myths

by Parag Mehta

*Presented at the* IEE EXPO 2010 CONFERENCE


**Abstract**

Hydraulic elevators dominated the elevator market for 50 years until the beginning of the 21st century. The Indian elevator industry has grown many folds in the past decade, becoming the focus of major elevator and original equipment manufacturers worldwide. Although the majority of the installations done in India are of the traction/machine-room-less (MRL) type, hydraulic elevators have also been around for many years and have gained market share in the past five years. As hydraulic elevators have their distinct advantages (such as low maintenance cost due to wear-free driving components, flexibility of car and machine-room design, safety features, and cost-effective installations); they are an appropriate choice for low-rise buildings, home lifts and car parking applications. This article attempts to clear some of the myths about hydraulic elevators and give an insight about this technology.


**Introduction**

Hydraulic elevator installation in India is not even 10% of the total elevators installed countrywide. The general opinion about hydraulic elevators is often influenced by misconceptions, which exist due to a lack of basic understanding of the technology. Often, investigations reveal that a hydraulic elevator that does not perform satisfactorily is usually the wrong equipment for the application. The practice of putting a power unit together by trial and error and learning-by-doing methodology results in an elevator installation that offers problems and unsatisfactory travel comfort. When a hydraulic system fails, a general tendency is to blame everything other than the system design, which in most cases is the root cause of the problem. The most important outcome from such blame is a bad reputation that hydraulic elevator technology earns, which, at times, is very difficult to reverse. For a hydraulic elevator to offer optimum performance, the power-unit design is the single most important factor and is where the most emphasis should be given.

**What Is a Hydraulic Power Unit?**

A hydraulic elevator is powered, driven and controlled by a series of components collectively called a power unit. Each component in the unit performs a task that can be independent or related with each other. A unit may comprise of a motor, hydraulic pump, tank, filters, flow-control valve and related hydraulic accessories. Cylinders are often referred separately.

Figure 1 shows a power unit that is made of various components. Each and every component has a unique role in the functioning of the unit. A power unit would function well if all components needed are rightly selected and properly adjusted.

**Myths about Hydraulic Elevators**

If the design of the elevator system is carefully and thoughtfully done, most of the myths about the hydraulic elevators would not exist. Some of the myths that one often hears about hydraulic elevators are:

- Hydraulic elevators are not good for a warm climate like that of India.
- Hydraulic elevators have poor travel characteristics and riding quality (i.e., jerky starts and stops, as well as frequent releveling while loading).
- Hydraulic elevators are not environment friendly.
- Hydraulic elevators consume more power than other types of elevators and are not economical.
- Hydraulic elevator installation means dealing with oil spillage.
- Hydraulic elevator technology is complicated and requires experienced personnel for servicing.

***Warm Climate and Hydraulic Elevators***

In 1973, hydraulic elevator production overtook the total traction production, more than doubling that of traction elevators each year since the mid 1980s. In 1986, approximately 70% of the all elevator units sold for new buildings in the U.S. were of the hydraulic type. Until 2000, hydraulic elevator production remained at three-to-four times that of traction elevators. These statistics are only for the National Elevator Industry, Inc. (NEII) member

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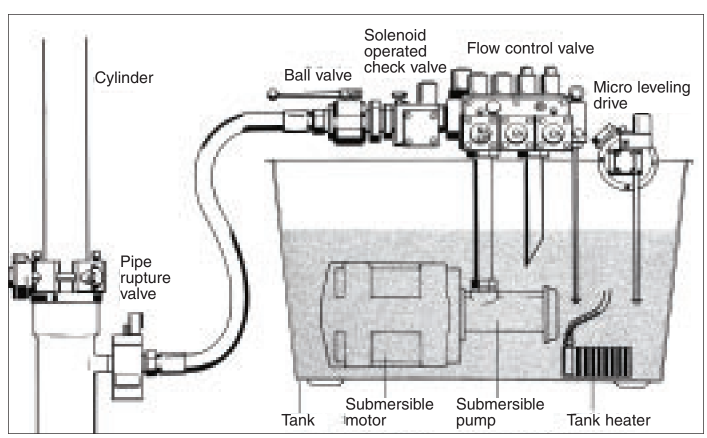


*Figure 1: Power unit of a hydraulic elevator*

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companies. Certainly, many more hydraulic elevators have been installed by non-NEII member companies throughout these years (Figure 2).

Many other countries in the world have warm summers and mild winters like India. Greece, Spain and some parts of the U.S. are good examples of that. Less than four years ago, 80% of the total elevators installed in Greece and 50% of the total elevators installed in Italy were hydraulic. If hydraulic elevator installation can work satisfactorily in such countries, why can't it work in India? In addition, hydraulics are used extensively in the Indian industry, so why should the warm climate only create problems for hydraulic elevators?

It's the not the warm climate, but, instead, improper system designs and wrong adjustments in the flow control valve that are mainly responsible for failures.

***Travel Characteristics and Hydraulic Elevators***

Jerky starts and stops, as well as frequent releveling on loading, are some of the misconceptions that are often associated with hydraulic elevators. These kinds of myths exist because of the following:

1) Elevated temperature of the hydraulic oil
2) Friction and alignment problems in guide rails
3) Friction in the cylinder seals
4) Wrong adjustment in the flow control valve
5) Wrong flow guides in the bass pass chamber of the flow control valve
6) Longer switching time of the motor from star to delta

A friction and alignment problem in the guide rails is an installation failure and has no connection with the power-unit design. Even a traction elevator would encounter a similar problem if the commissioning of the elevator is not done correctly. Similarly, the wrong adjustment of the flow control valve and the wrong selection of flow guides are failures, which can be avoided by simply studying the product properly and understanding its working principles and adjustments. Additionally, by using soft starters, jerks experienced in the start due to star-delta switching can be avoided. Keeping the oil temperature within the required temperature range is something that can be mostly managed by adjusting the flow control valve properly. A wrongly adjusted flow control valve, whereby the startup (bypass time) and leveling time is longer than expected, heats the oil un-necessarily (Figure 3). Additional issues that can cause the oil temperature to rise are: Continued

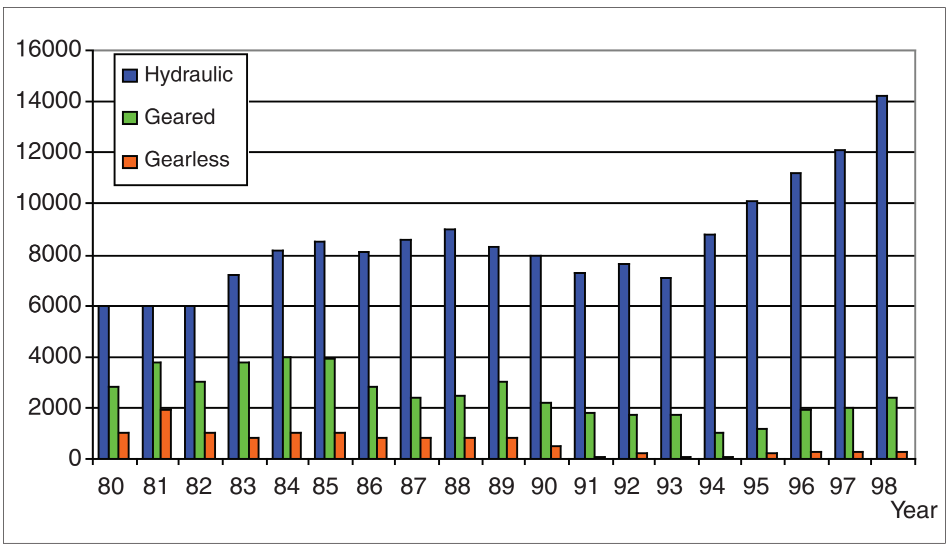
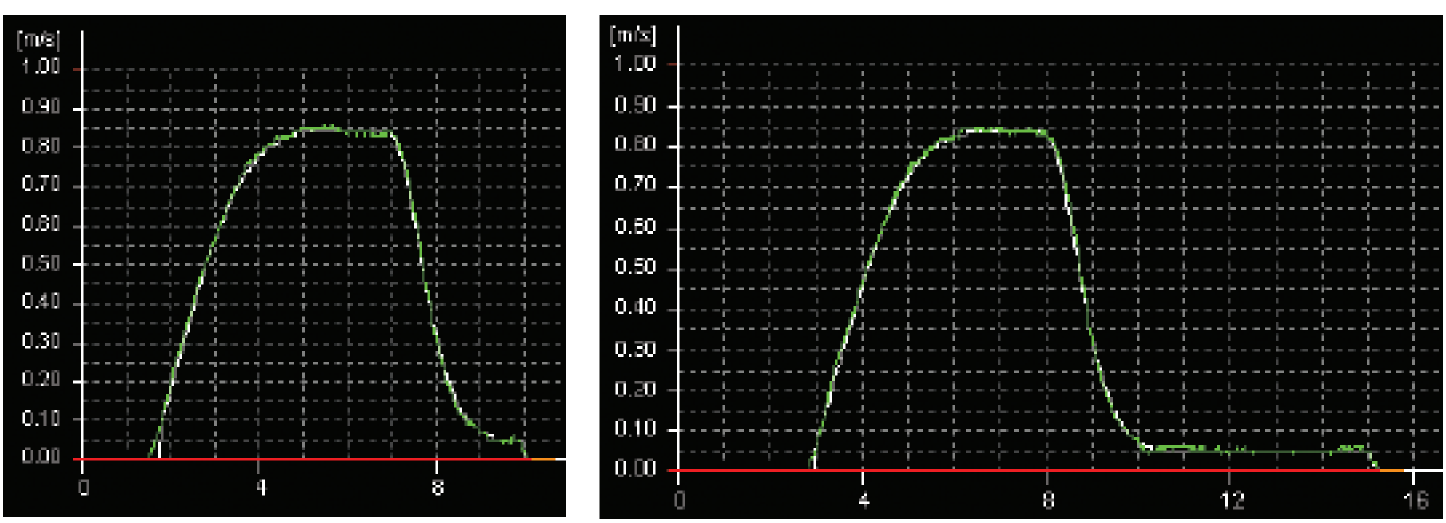



*Figure 2: Elevator production between 1980 and 1998 in NEII member companies[1]*




*(a)* *(b)*

*Figure 3: Travel curves of a hydraulic elevator (a) correct bypass and leveling adjustment (b) incorrect (longer) bypass and leveling adjustment*

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1) Too long piping and turbulent flow in the circuit
2) Frequency of elevator runs too high for the rate of heat dissipation from the installation
3) Inadequate machine-room ventilation.

The previously addressed problems can be easily avoided by selecting a pipe or hose adequate for the application. The selection of the pipe should be made according to the application as there are recommended velocities of oil flow for various categories, i.e., for suction line it is 0.48-1.5 mps (1.6-4.9 fps), for pressure lines 2.98-10 mps (9.8-32.8 fps) and for return lines 2-5 mps (6.6-16.4 fps).

Properly designed hydraulic elevator systems can comfortably handle heavy traffic like that found in shopping malls or airports. However, such a power unit has to be designed and configured while considering the number of calls it would execute in a given time and the environment in which it is going to be operational. Most of the heat generated is supposed to be dissipated in the machine room; therefore, it is extremely necessary that the machine room have adequate ventilation.

In most cases, the elevator shaft is just behind the machine room. Each time the elevator car moves, it pushes the air above it and sucks the air underneath. The pumping action of the elevator car in the shaft can help cool the oil in the power unit. Preferably, the machine room can have a small opening in the shaft wall such that the biggest side surface of the tank faces the opening. The top window in the shaft allows fresh air to enter the shaft and the air under the car is pushed out of the machine room window as the car travels down. Conversely, fresh air is sucked from the machine room window into the shaft and the air on the top of the car is pushed out of the shaft window. Thus, all of the air pumped by the car in the shaft blows air on the tank and helps cool the tank naturally without any additional inputs (Figure 4).

Using an oil cooler is another option that can offer an effective solution in maintaining the oil temperature if nothing else helps. However, with a thoughtful system design and correct product configuration, oil coolers are rarely required. Thus, an erratic travel characteristic of a hydraulic elevator is more associated with adjustment errors and in adequate planning or implementation of the elevator system and not because of any basic shortcomings in the hydraulics domain.

***Hydraulic Elevators and Environment***

We cannot ignore the fact that using an ecological product is going to be a must in the very near future. Environmental protection agencies worldwide are advocating using more environmentally friendly technologies and products, which can be recycled. A hydraulic elevator installation for a small building or home would have a tank that could be big enough to contain approximately 75-150 liters of oil. Of course, the size of the elevator, the cylinder and the pump primarily determine the volume of oil required to operate the elevator, but one should not overlook the fact that the life span of the hydraulic oil used in the elevator system is approximately 10 years. That means oil in the tank and in the system needs to be replaced every 10 years. Is that too much of an ecological disaster that one should rule out using hydraulic elevators completely and brand it as environmentally unfriendly? Perhaps more fuel is used in cars every month than what a hydraulic elevator might use in 10 years. Bio-degradable oils can be used where local authorities enforce and OEMs permit.

*Figure 4: Power unit placed in wall closet allowing natural oil cooling with every elevator car movement (courtesy: Leistriz)*

| Counter weight | Piston length [m] | Piston diam. [mm] | Suspension ratio | Cylinder pressure [bar] | | Speed [m/s] | Flow rate [lt/min] | Motor power [kW] |
|---|---|---|---|---|---|---|---|---|
| | | | | Empty | Full | | | |
| No | 4.5 | 70 | 2:1 | 22.9 | 55.1 | 0.64 | 74 | 8.5 |
| **Yes** | **4.5** | **60** | **2:1** | **10.4** | **54.1** | **0.64** | **54** | **6** |

*Table 1: Energy consumption of hydraulic elevator with and without counterweights*[2]

***Hydraulic Elevators and Energy Efficiency***

A hydraulic elevator consumes power only while traveling in the up direction. It descends by gravity and does not need power in the down direction. In addition, hydraulic elevators with a servo-electronic valve offer better energy consumption in some cases, with an additional advantage to remote monitoring through normal telephone lines. Power-units with variable-voltage variable-frequency (VVVF) drives also claim to save energy when the usage of the elevator is high and return on investment can be made within a defined time. Quality motors can be overloaded up to 30% without problems as the operational time is quite short compared to any other motor in continuous duty. In contrast, over-sized motors run at low efficiency causing unnecessary energy consumption. Therefore, hydraulic elevators are the best choice for low rise buildings.

The myth that power consumption of a hydraulic elevator is two to five times more than that of traction elevator is based on the fact that the energy consumption of the traction elevator with counterweights is compared with that of hydraulic without counterweight. The hydraulic elevator generally does not use counterweights and are consequently safer at the expense of an increase in motor power. On the other hand, they can be constructed with the counterweight balance under suitable conditions so that analogous energy savings similar to traction elevators can be obtained (Table 1 and Table 2).

Another configuration of the counterweight for the hydraulic elevators is shown in Figure 5, where the counterweight is placed on a pull ram. By doing so, smaller diameter rams and smaller pumps can be used. Such a configuration can prevent the counterweight from swinging in the shaft. The cylinder is in tension and not subject to buckling forces, which reduces the cylinder diameter and oil volume. Systems with pull-type cylinders and counterweight claim to save substantial power and are therefore a good option for hydraulic elevator installations.

Hydraulic elevators can be made even more energy efficient without compromising speed. The total travel time can be maintained by reducing the up travel speed and increasing the down speed thereby maintaining the total travel time. As hydraulic elevators do not consume power while traveling, down increasing the down speed is very logical (Table 3).

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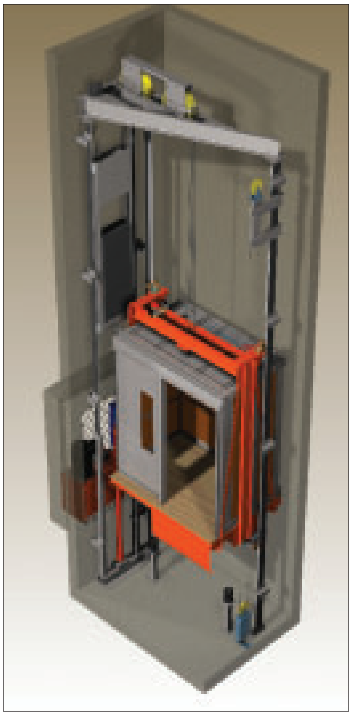


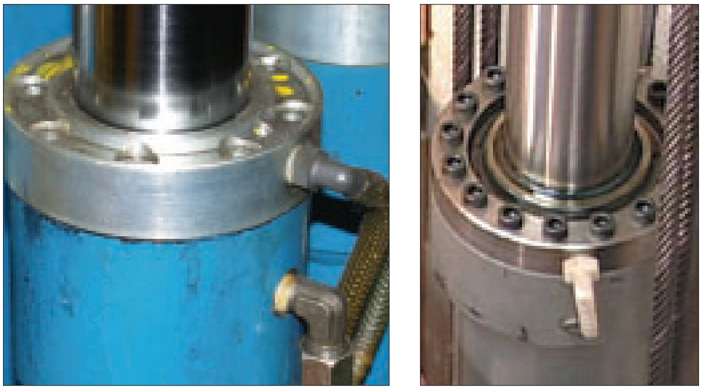
*Figure 5: Hydraulic elevator with pull type cylinder and counterweight (courtesy: Leistriz)*

| | Yearly energy consumption [kWh] |
|---|---|
| Refrigerator | 350-500 |
| Dishwasher | 400-600 |
| Washing machine | 445 |
| Television | 230 |
| Iron | 250 |
| Gas oven | 25 |
| Lights | 50 |
| **A typical residential hydraulic elevator** | **600-800** |

*Table 2: Comparison of the energy consumption of an elevator with various household equipment*[2]

| Travel speed [m/s] Up and Down | Modified travel speeds [m/s] | | Modified travel | |
|---|---|---|---|---|
| | UP | DOWN | Reduction in motor power % | **Daily energy consumption [kWh]** |
| **0.8** | 0.66 | 1 | 17.5 | **3.9** |
| **0.8** | 0.72 | 0.86 | 10 | **4.3** |
| **0.7** | 0.53 | 1 | 24.3 | **3.2** |
| **0.7** | 0.6 | 0.84 | 14.3 | **3.6** |
| **0.6** | 0.43 | 1 | 28.3 | **2.6** |
| **0.6** | **0.5** | **0.75** | **16.7** | **3.0** |

*Table 3: Balancing the travel time. Travel distance: 12 m, trip time: 6, 2:1. Therefore, claiming hydraulic elevators to be uneconomical is inaccurate and misleading.*



(a) (b)

*Figure 6: (a) Oil drainage pipe from cylinder head to tank (standard practice); (b) a cylinder head without an oil drainage pipe, resulting in oil spillage in case of oil leakage due to oil seal failure*

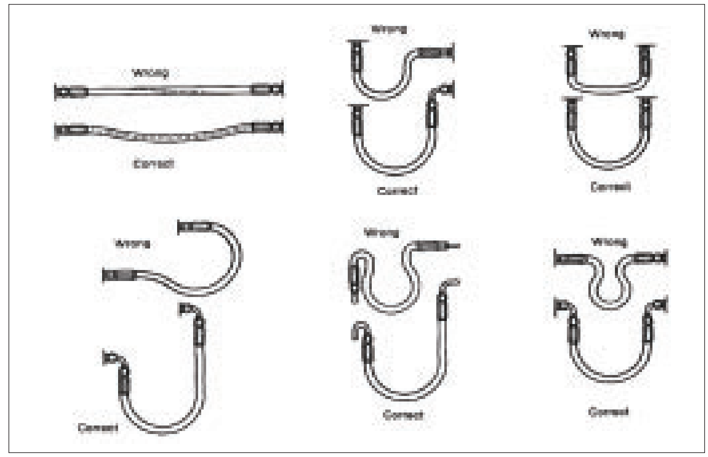


*Figure 7: Hose pipe bending techniques*

### *Hydraulic Elevator Does Not Mean Oil Spillage*

Sometimes, one can see oil accumulation below a cylinder or oil dripping out of the cylinder with every travel an elevator makes. The reason is the oil seal in the gland/cylinder head is worn out or not the correct choice for that particular cylinder. Lack of sealing know-how, unfair and unprofessional practices often result in oil spillage. Using nonstandard hydraulic pipe fittings originating from different suppliers is another reason for leakages.

However, that should not create a mess in the shaft. It's a standard practice to have a drain pipe carry the oil back to the tank or in a separate collector in case of oil accumulation on the cylinder head (Figure 6), but unfortunately it's not seen in every elevator installation. Having a simple drain pipe does not cost anything but takes care of the problem in case of oil accumulation. The accumulated oil is safely filtered and brought back to the tank preventing any mess. Other cause of oil spilling out of the system is purely due to poor handling. Often, while servicing or during routine maintenance, care is not taken when opening joints or flanges resulting in unnecessary oil spillage.

Use of couplings and connectors is usually required in piping and often some common misconceptions are taken into consideration (e.g., if a coupling is compatible with a hose that meets Society of Automotive Engineers (SAE) or European Norm (EN) specifications, the coupling will work with hoses that meet the specifications. This is simply not true. When making or buying an assembly, it is strongly recommended that hoses and fittings all come from the same manufacturer. That's because dimensional tolerances listed in the standards are quite broad. Hoses not manufactured with tightly controlled dimensions might still meet the standards, but may be difficult to assemble and may perform non-satisfactorily due to compression variations when crimping the coupling on to it (Figure 7).

### *Hydraulic Elevator Technology Is Not Complicated*

There is nothing to adjust in the motor or pump. With only a flow control valve to adjust that has just a few adjustments, it's difficult to understand how a power unit could be complicated. Most of the spare parts, like o-rings, connectors and fixtures (which are readily available in the open market) make replacements trouble free.

Some of the advantages of hydraulic elevators are:

- Safe and reliable solution for vertical transportation as hydraulic elevator offers easy rescue of passengers during fires and earthquakes.
- Easy and safe to service as the machine room is located in the cellar or basement and not on the top of the building.
- Readily available spare parts in the open market give independence and flexibility while maintaining the system and do not leave the customer at the mercy of OEMs.

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(1) D. Sedrak, "Hydraulic Elevators: A Look at the Past, Present and Future," ELEVATOR WORLD, June 2000, pp. 100

(2) Dr. F. Celik and Dr. B. Korbahti, "Why Hydraulic Elevators Are so Popular? Part 2," *Asansör Dünyasi*, April 2006, pp48.


**Parag Mehta** works in design and development for Blain Hydraulics GmbH, Germany.


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# More Attention Needed For Heavy Escalators

by Dr. Ali M. Albadri

**Dr. Ali M. Albadri** is a chief engineer at Tube Lines Materials Services. He manages a team of mechanical engineers and test inspectors, as well as managing a drawings office, which contains 45,000 engineering drawings. In addition, his responsibilities involve managing projects by conducting planning, costing, arranging assets inspections, checking designs to standards, writing specifications and testing. Albadri previously worked as a senior mechanical design engineer at Hydronix Ltd. and KeyMed Ltd. He began his academic career at Technology University in Baghdad, Iraq, where he received a BSc in Mechanical Engineering and a BSc in Physics. He then pursued a degree in Materials Science and graduated with a M Phil from the University of Sheffield in the U.K. In 1996, Albadri received a PhD in Materials Science from the Materials Science Centre, UMIST, in Manchester, U.K.

Heavy and light-duty escalators operate in accordance to the same mechanical engineering principles and theories. However, their operational conditions are very different.

Heavy-duty escalators are installed in, near or around locations where the density of passengers is high. They have high rise (more than 10 m), and endurance (working more than 20 hours a day). Therefore, they have a much higher service loading.

Despite the importance of heavy-duty escalators in any public-transportation system, such as trains and underground networks, they do not hold the same interest and attention of specialist manufacturers, as light-duty escalators do. In most cases, heavy-duty escalators have been ignored by the manufacturers or the companies that operate them. They are starved of investment and consistent R&D programs. Therefore, most heavy-duty escalator designs have remained behind when compared with light-duty escalators using 21st century technology.

The market size of light-duty escalators is much bigger than that of the heavy-duty type. The levels of profits against the levels of investment have not worked that well for heavy-duty escalators. The profit margin becomes viable only when a high number of escalators for refurbishment or replacement are materialized, or when there is a long-term contract to service a number of them. The design specifications of the heavy-duty escalator are different than those of the light-duty escalator. This is reflected in the level of design work; the heavy-duty type needs more design work and time than the light type.

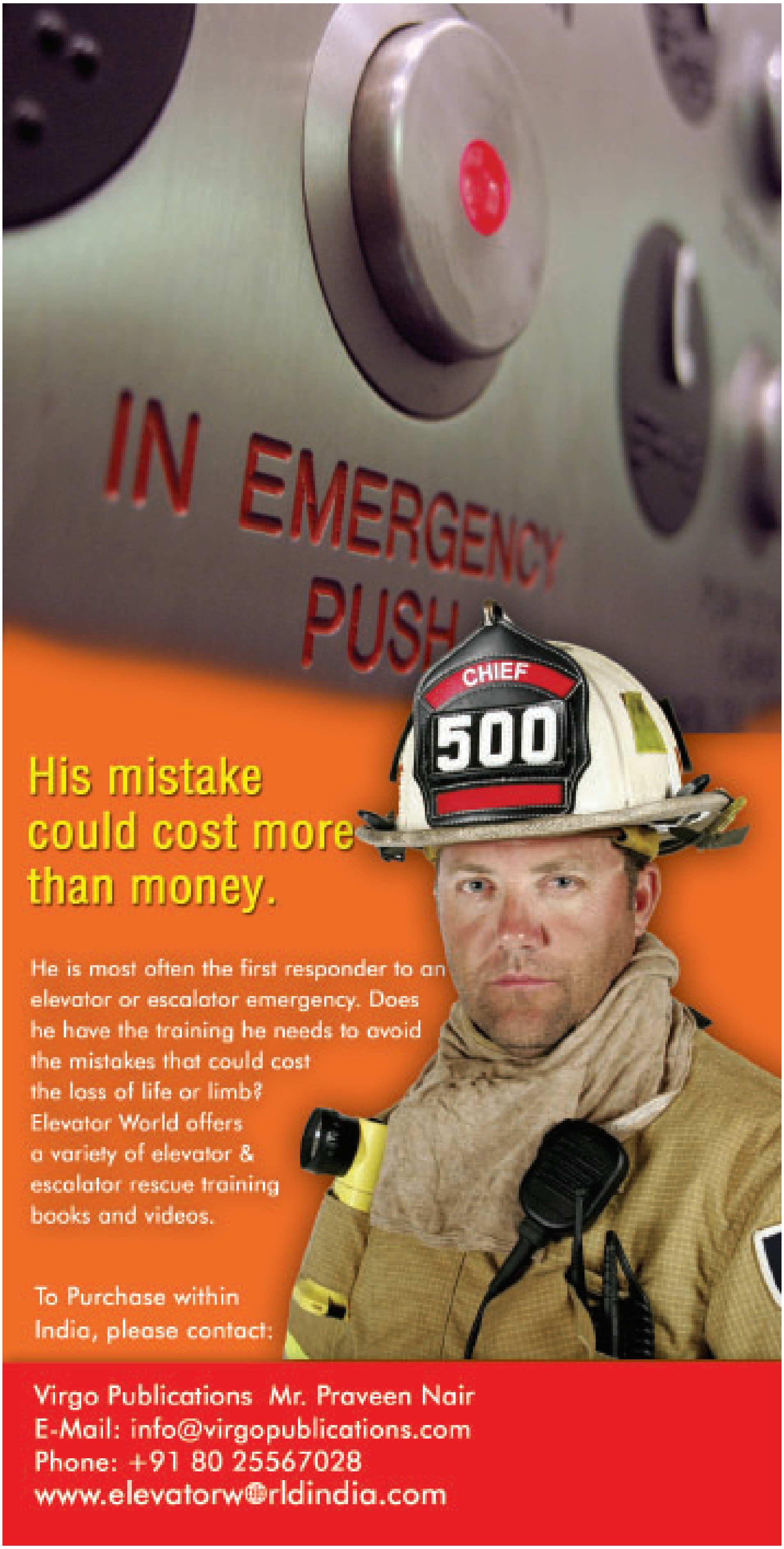
Companies have tried transferring some technologies and methods of manufacture from the light-duty escalator sector to the heavy-duty sector. This has not worked, because of the differences in the operation conditions. For example, specialist manufacturers have adopted the strategy of mass production to manufacture the light-duty escalators in the form of standard modulus and common parts. They have tried to convert this method to the heavy-duty sector. Unfortunately, this avenue has not worked because of the level of the strength and endurance limits (fatigue life) that the parts and the sub-assemblies of heavy-duty escalators need in comparison to light-duty escalators. This has led to poor designs, causing the need of high investments to keep the machines in safe operational conditions.

Heavy-duty escalators tend to be completely or semi bespoke designs, depending on the space needed for constructing the machine. One important parameter making the task of the manufacturer troublesome is the lack of clear separation between the escalators as independent machines in their own right, with regard to their relationship to the civil structure in which they are installed.

Clarity is needed in specifications and standards drawn by the customers. The customers should make the required level of financial commitment to separate the civil structure from the mechanical machines. Where the two interfere with each other because of the complexity of the site, the owner of the machine should make some investment toward converting the site so that the escalators have total independence in future maintenance or replacements.

Ignoring the manufacturers of heavy-duty escalators has left the sector in stagnation, without radical developments that fall in line with the 21st century. Manufacturers and customers need to work together to deploy new strategies for long-term investments in the sector of heavy-duty escalators. Part of this strategy should be based on deep technical understanding of the level of the technical challenges in designing parts and sub-assemblies for the heavy-duty sector. The manufactures need to push the customers to clarify their standards by separating the escalator as an independent machine from the civil structure. A clear separation would reduce the financial burden on the manufacturers.

We might have missed some other issues in this article, but we have touched on the critical ones. Dealing and resolving these issues will contribute in increasing the manufacturer's confidence to invest for the long term and see the heavy-duty escalator sector as a viable business option.

# Fire-Resistant Doors in the Context of Firefighters' Lifts

by Sergio Biglino

*Presented at the* IEE EXPO 2010 CONFERENCE

**Safety First**

New concerns for evacuation of people from high-rise buildings during a fire have led to the development of the EN 81-72 standard *Safety Rules for the Construction and Installation of Lifts-Particular Applications for Passenger and Goods Passenger Lifts – Part 72: Firefighters Lifts*. After its approval in 2002, the need for firefighters to reach every floor quickly and safely in a modern high-rise building has become a key component of the overall building safety procedure. Safety is safety and it is not negotiable. The manufacturers' first concern should be passengers' safety. Upgrading the safety level of new installations to modern standards is also important.

**EN 81-58 Fire Resistance Norms to Avoid the Spreading of Fire through the Lift Shaft**

The division of a building into compartments is a crucial aspect of the design from the point of view of safety. A compartment may be defined as a part of a building comprising rooms, spaces or storage areas constructed to prevent the spread of fire to or from another part of the same building or to an adjoining building. The division of the lift shaft into compartments is a special case, as fire entering the lift shaft can easily spread to upper and lower floors. This is why the fire resistance of lift landing doors is crucial to avoid fire propagation in the building.

In fact, when using a fire-resistant landing door, the fire has to overcome two barriers until it finds combustible material again in the next floor, as the shaft itself normally contains very little material that can sustain fire.

A key aspect of EN 81-58 is the fact that a compliant landing door must be able not only to prevent fire, but also to minimize hot smoke and gas leakage that enters the shaft. The rationale behind this can be traced to what is normally called the chimney effect. The lift shaft is typically opened at the top for ventilation purposes, and it has a lower temperature compared to the building rooms, at least during the winter. These combined effects mean that higher hot gas leakage rates tend to occur at lift landing doors compared to the leakage rates occurring through standard doors between rooms at the same floor.

By deploying special design and features, such as labyrinths, an EN 81-58 landing door is able to reduce leakage of gas to a minimum and to avoid transmission of flames. Only through R&D expertise and extensive testing is it possible to obtain an effective design for a substantial reduction of gas leakage.

**The Development of EN 81-58**

The standardization work for EN 81-58 started in 1983 under the direction of Dr. P. Vandevelde from the University of Ghent in Belgium. At the end of the research phase, the focus of the norm was placed on how to evaluate integrity to reach a high safety level. Consequently, only a complete and direct leakage measurement was deemed adequate for this purpose. The testing methods were developed accordingly with the assistance of four major laboratories in Europe and the cooperation of all European manufacturers, who provided standard doors and special landing doors for testing.

The EN 81-58 norm was ratified in 2003 and harmonized under Lift Directive 95/16/EC in 2004. The compliance with this standard helps to ensure the presumption of compliance to the Essential Health and Safety Requirements of

*Figure 1: The shaft is a critical area used to control or avoid fire propagation in the building.*

Annex I of 95/16/CE. This norm was enforced on the territory of the European Union (EU) and gradually accepted by a growing number of countries, including India. National building legislations within the EU were changed to recognize EN 81-58 as an accepted method to evaluate fire resistance of lift doors, by adopting an EN 81-58 class of resistance, closely matching the previous local requirements.

The reception of EN 81-58 in the national standards brought a positive effect. As this norm superseded many national standards for lift doors, it also eliminated technical differences among fire-resistant doors available in Europe. Manufacturers could then concentrate on the design and testing of EN 81-58 doors, without having to test slightly different doors to comply with the differing national standards.

**EN 81-58: Reliable Testing Procedures with a High Degree of Repeatability**

EN 81-58 is a standalone standard for fire-resistance assessment of lift landing doors, which includes test methods, criteria and a classification system. By only making use of calibrated measuring equipment, with no manual intervention, the EN 81-58 test integrity results are repeatable with only a minor possibility of deviation or interpretation.

There are essentially three criteria to be considered for EN 81-58 compliance:

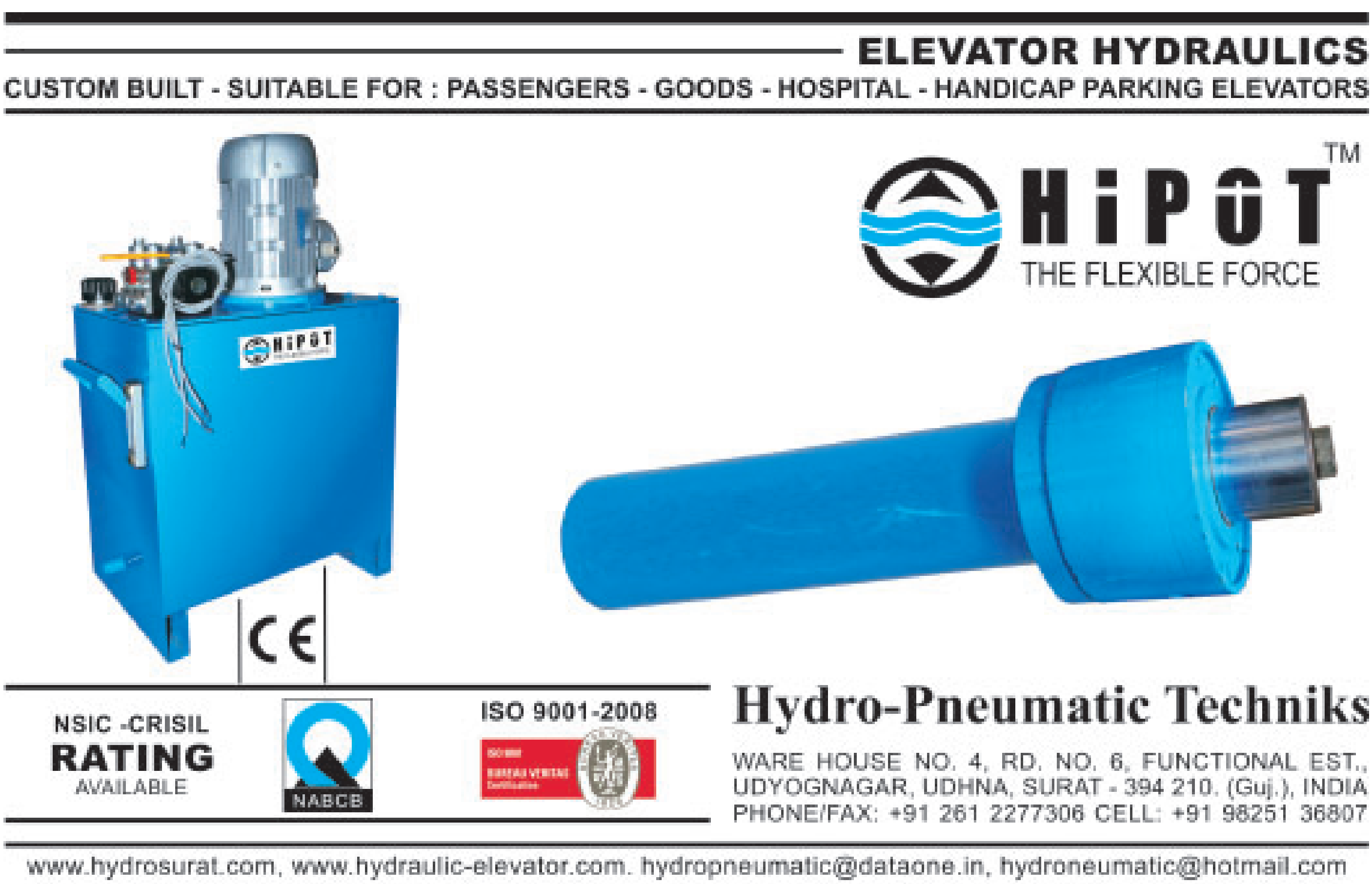
1. **Integrity (E):** The criterion is satisfied, as long as the leakage rate per meter width of the door opening does not exceed 3 m$^3$pm. Integrity shall be considered to be lost by the occurrence of sustained flaming (>10s).
2. **Thermal insulation (I):** The criterion is satisfied if the average temperature rise does not exceed 140°C and the maximum temperature does not exceed 180°C.
3. **Radiation (W):** The criterion is satisfied as long as the measured radiation does not exceed the value of 15 kWpm$^2$, as specified in EN 1363-2.

Integrity (E), thermal insulation (I) and radiation (W) are assigned to the corresponding resistance times in minutes to obtain the door fire resistance classes according to EN 81-58.

Continued

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E | 15 | | 30 | 45 | 60 | 90 | 120 |
| EI | 15 | 20 | 30 | 45 | 60 | 90 | 120 |
| EW | | 20 | 30 | | 60 | | |

*Table 1: Door fire resistance classes according to EN 81-58*



The entire EN 81-58 testing procedure can be summarized as follows:

- Before performing the testing procedure, a full detailed specification of the specimen provided prior to testing must be supplied for evaluation purposes.
- The door under testing is installed on a vertical furnace using its standard supporting construction. A first measurement of clearance gaps between moving and fixed parts and a functionality test on the assembled door ensure that the door is installed in normal working conditions.
- Heat is applied in a vertical furnace following EN 1363-1 specifications, with a measured overpressure on the exposed side between –2 and +2 Pa at sill level. Only the landing side is exposed to heat.
- A canopy over the non-exposed side collects the leaking combustion gas.
- During the first 14 minutes, the gas flow through the gaps is measured but disregarded. Measuring integrity failure only starts after 15 minutes to avoid deviations due to rising temperature and high turbulence in the first phase.
- Evaluation of leakage rate is performed using tracing gas system equipment.
- Unexposed face temperature is measured with five thermocouples per each door leaf, in a standard position determined by the norm.
- Temperature of door frame is also measured with at least two additional thermocouples.
- The heat radiation is measured from the unexposed face following EN 1363-2 norm.
- More than 10 seconds of continuous flaming on the unexposed side is considered as loss of integrity (E).

After successfully passing the testing procedure, a detailed test report with complete door specifications and a step-by-step description of test results and their evaluation is produced. A Notified Body then issues a Type Examination Certificate. The tested door model can then be supplied on the market with a data plate that contains information about the manufacturer, door type, certification number, reference to the test method standard, class of resistance of the door and other optional relevant information.

**Qualified Certification Laboratories**

An important part of EN 81-58 refers to the qualified certifications laboratories that are allowed to perform the testing procedures. The features of these laboratories are defined according to the *EU Construction Products Directive 89/106/EEC*. It is important to remark that a manufacturer certified according to Annex IX or XIII of the Lift directive 95/16/EC can be entitled to carry out tests and issue relevant certifications. In this case, national bodies carry out periodical evaluation of the testing equipment. It is possible that the services of a third-party qualified laboratory assists repeatability of the testing procedure and represents EN 81-58 certification.

Figure 2: A firefighters' lift car compliant with EN 81-72

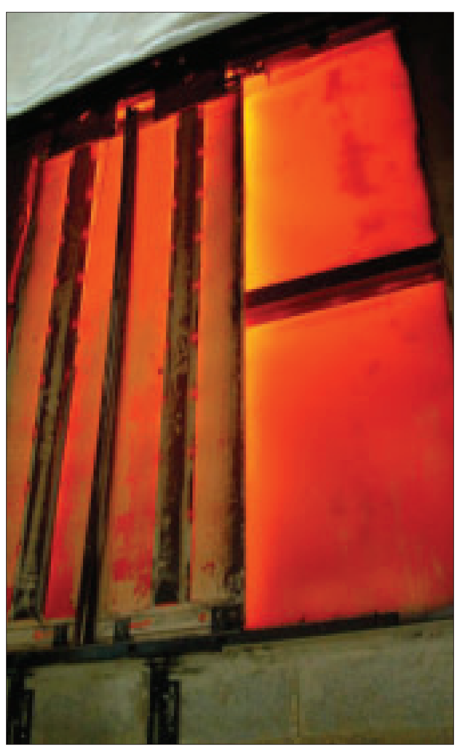


Figure 3: A Wittur Augusta two-panel center-opening door during testing for EN 81-85 E120 certification

**Applicability of EN 81-58 Doors for Firefighters' Lifts (EN 81-72)**

After summarizing why the EN 81-58 is important in order to reach a high level of safety and how the testing procedure is performed, it is also important to ascertain the applicability of EN 81-58 doors in the context of firefighters' lifts. If one examines the EN 81-72 (Chapter 5.1.1) he or she will find that the level of fire resistance of the wall and the doors of the firefighters' lift environment are defined by national regulations. In particular, EN 81-58 compliant automatic landing doors can be used on firefighters' lifts. Additional requirements:

- The lift is located in a shaft with a fire-protected lobby in front of every landing door (5.1.1).

- Electrical/electronic landing control devices and indicators can work in a temperature range of 0°C-65°C for the same duration required for the structure (e.g., 120 minutes) (5.1.2).
- Any electrical equipment located on the doors is protected to IPX3 (5.3.2).

**Main Features of Firefighters' Lift Car according to EN 81-72**

Another important part of EN 81-72 deals with the design of the car . Wittur produces lift cars, which must comply with the following requirements:

- The lift must be designed according to EN 81-1 or EN 81-2 and feature additional protection, controls and signals.
- During a fire, the firefighters' lift is to be used under the direct control of the fire service, by means of a firefighters' lift switch to enable the different operation phases (I and II, according to *EN 81-73 Behaviour of Lifts in the Event of fire.*

*Figure 4: A Wittur Hydra two-panel center-opening door during testing for EN 81-55 EI 120 certification.*

- The minimum dimensions of the car are 1,100 X 1,400 mm, with a rated load not less than 630 kg and a minimum clear entrance width of 800 mm (according to ISO 4190-1). Where the intended use is to include evacuation, the minimum rated load becomes 1000 kg and the minimum dimensions become 1,100 X 2,100 mm (also according to ISO 4190-1).
- The car must be equipped with an emergency trap door operable without tools for the rescue of trapped firefighters
- The lift system must be able to reach the furthest floor in less than 60 seconds after the closing of the lift doors and must be equipped with an emergency supply.
- A fire-service communication system must be in place to enable two-way communication during firefighters' operations.

**Conclusion**

The new concerns for evacuation of people from high-rise buildings during a fire, which led to the development of EN 81-72, have become key components of the safety of modern buildings. The use of EN 81-58 fire-resistant landing doors on these lifts further enhance the possibility for firefighters to use them to reach floors quickly and evacuate people safely.

**Sergio Biglino** is vice president of Sales & Marketing for the Wittur Group.

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# Otis in India

## Otis India Applies Global Expertise and a Wide Array of Solutions to Meeting Growing Infrastructure Needs.

*by Sameer Joshi*

Otis Elevator Co. has been a leading manufacturer, installer and maintainer of elevators, escalators and moving walkways for more than 150 years. Otis elevators and escalators touch the lives of people in more than 200 countries around the world, including India.

After a detailed study of market dynamics, Otis India rolled out new solutions to support the growing demand for automatic-door elevators by launching Optimus and Quantum products to cater to the 1-1.5 mps category in most of the residential and low premium commercial market. It has also addressed the needs of premium residential complexes, hotels, premium commercial properties by supplying state-of-the-art gearless products like OH5000, environmentally friendly Gen2® and XO508 escalators from its overseas associates. To address the trend of affordable housing, the company is developing a new elevator with an automatic door system.

Real estate activity in India has picked up after a long lull in the country during the global recession in 2009. Now that the economy has, again, started showing a revival, there is a visible movement in the development of residential and commercial projects across the country, with the residential segment dominating this growth. The recently announced Union Budget 2010-2011 provides a significant stimulus to the Indian real estate sector.

The main segments of future real estate development include affordable housing across the country, including tier two and three cities, infrastructural developments like metro systems and the modernization of airports and skyscrapers in main cities like Mumbai and Bangalore.

With developers vying with each other to take their share in these development areas, the elevator industry is bullish on the market potential for elevators, escalators and moving walkways over the next decade. The market for elevators, escalators and moving walkways is on the upswing in India. The current elevator market is close to 30,000 new units per annum, and installation is estimated to be growing by 15% year on year. The western and northern regions continue to witness high demand of elevators and escalators with Mumbai and Pune in the west and National Capital Region in the north. The other growth areas for the industry are Bangalore, Hyderabad and Chennai in South and Kolkata in the east.

Otis emphasizes a corporate policy of safety first and implements standardized procedures to ensure that every installation and service task is performed the safest way, every time. As a company in India, Otis works to ensure that safe work processes are adopted. The company has also involved families in its safety awareness programs, as safety is important to the individual as well as their families. Nothing is more important than the safety of everyone who builds, installs, maintains and rides the elevators, escalators and moving walkways. Otis believes that the safe way is not just the right way – it is the only way.

### A Commitment to Service

Otis states that service begins with each employee's commitment to improve things – no matter how small. The company strives to exceed expectations of customers and employees. This is accomplished by management and empowered associates working together to implement the Achieving Competitive Excellence (ACE) operating system and philosophy throughout the organization. With a service base of more than 45,000 units and more than 80 service centers across India, from Jammu and Kashmir to Kanyakumari, the company provides qualified and professional service personnel who meet the needs of their clients. OTISLINE® is Otis' dedicated customer service facility that offers 24/7 customer service support. It is currently operational in all major metros in India.

### Innovation and Comfort

With a constant focus on introducing new and improved technologies and products to the Indian market backed by global expertise, Otis is positioned to meet the growing and changing needs of customers, energy-efficient performance and minimal impact on the environment. Reflecting its commitment to the environment, Otis has engineered energy-saving products like Gen2 elevators, which when combined with ReGen™ drives can result in total energy savings of up to 75% compared to conventional systems with non-regenerative drives. ReGen drives feed energy, usually lost during braking, back into the building's internal electrical grid, where it can be used by other loads or users connected to the same network. The Gen2 system does not require any additional lubrication, eliminating the need for storage, cleanup and disposal of hazardous waste. In India, Otis has a healthy Gen2 order booking for residential, commercial and hotel structures.

ReGen drives are particularly suited for low- and mid-rise residential and commercial buildings. ReGen drives also produce clean power, resulting in less pollution of the building's electrical power system and helping to protect sensitive building equipment. By minimizing radio frequency interference, these drives reduce disruptions to other building electronic systems, ensuring compliance with regulations.

Peak-hour traffic in a busy high-rise often means long waits, a scramble for each arriving elevator, crowded cars and too many stops. The Compass™ Destination Management minimizes these inconveniences by assigning each passenger to the most appropriate car. The Compass system can be integrated into a variety of architectural environments. Its features include:

- Intuitively designed keypads and touch screens
- Instant car designation
- Specific car assignment
- Optional interface

In order to cater to the Indian market, Otis India formally launched the Gen2 Comfort system on February 2 in Mumbai. Its safety features include a door deterrent device, hoistway access detection, rescue system, infrared entrance protection system and improved stopping accuracy. Controlled process minimizes installation time and improves safety. Standard features include:

- Anti-nuisance car call protection
- Automatic car return device (home landing)
- Independent service
- Overload device
- Nudging
- Emergency firemen's service
- Audible car-call button
- Emergency car light unit
- Door time protection
- Emergency alarm button
- Belt inspection device

Optional features:

- Advance door opening
- Car chime
- Emergency power operation
- Down collective operation
- Parking key switch
- Automatic rescue device
- Voice synthesizer
- Inter-communication car to controller and lobby

Continued

Gen2 Comfort elevators will be manufactured at the Otis facility in Bengaluru. This manufacturing facility was set up in 1996. Bengaluru Works is ISO 14001 certified and maintains an environmentally friendly working area and disposal system through the shop floor concepts of lean manufacturing and value stream mapping.

Otis modernization programs offer upgrades for existing elevator systems to microprocessor-based variable-frequency (VF) drive control systems by retaining as much of existing mechanical components as practicable by utilizing pre-engineered packages. Recently, Otis launched two new modernization packages for its customers. The AC1 X'Press modernization package upgrades existing manual door elevators and is suitable for up to 14 stops. It includes a microprocessor-based VF controller, luminous buttons, new wiring and locks, and multiple options of buttons and fixtures. Permanent magnet (PM) gearless machine with variable voltage and variable frequency (VVVF) technology upgrades old DC gearless elevators with running speeds of 2.5 mps. Otis recently undertook the modernization of elevators at the Oberoi Hotel in Mumbai, Le Meridian Hotel and the Gas Authority of India Ltd. in Delhi, and the Public Utility Building and Vijaya Bank in Bengaluru.

Otis India has also introduced a customer-friendly elevator installation method that does not require scaffolding – called "scaffold-less installation." For Gen2 Comfort and other traditional-type elevators, the installation is done using contract materials without the use of scaffolding. This method uses the car enclosure/car top as the working platform for installing all elevator components, machine and roping. This method improves the cycle time of the elevator execution as compared to the conventional method of having scaffolding erected. The scaffold-less method means the equipment is available for movement of material and manpower from the commencement of work on a project.

With its headquarters in Farmington, Connecticut in the U.S., Otis employs 61,000 people worldwide, offers products and services in more than 200 countries and territories and maintains 1.6 million elevators and escalators.

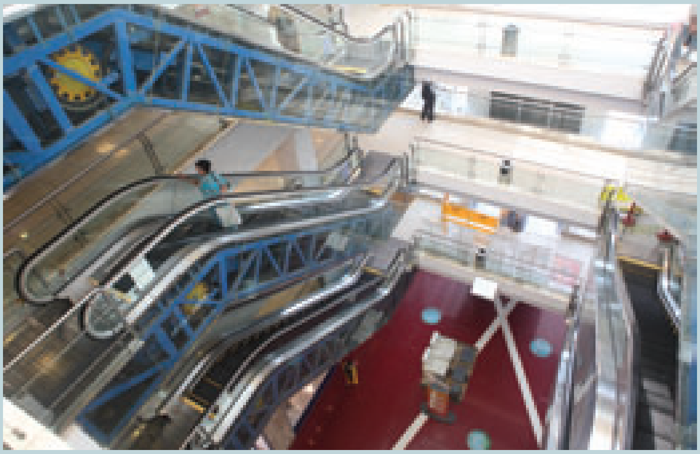
**Sameer Joshi** is currently working with Otis Elevator Company (India) Ltd. as general manager and is responsible for Corporate Communications and Modernization. He passed his Electrical Engineering (BE) from Mumbai University in 1991. In his more than 18 years in corporate work, Joshi has held positions of increasing responsibility in the areas of sales, product management, marketing, business development and strategy planning. Under his leadership over the last two years, Otis India has grown in its Modernization business.

## Otis in the Atria Mall

Atria Mall is one of the first malls in Mumbai. Its location in the up market South Mumbai precinct of Worli was key factor to its success. The mall attracts customers from every corner of the city who come to experience shopping and food in an international atmosphere. Today, the mall is just one among dozens of new malls in every nook and corner of the city. This landmark project has been developed by M/s. Alif Enterprises and designed by M/s. Hafeez Contractors, a leading architectural firm in the country.


*Atria Mall in Mumbai*

The defining feature of the mall is its huge atrium, which was especially designed to allow shoppers an uninterrupted view of every storefront within the mall, thereby making the center a customer- and retailer-friendly property.



The mall atrium

To enable the smooth and efficient flow of traffic at all levels of the mall, Otis provided and installed six Gen2™ machine-room-less (MRL) elevators and eight escalators.

Glass-enclosed hoistway

The MRL passenger elevators in this mall were installed in a glass elevator shaft, and the elevator itself has a glass cabin with glass doors. As a result, passengers enjoy a panoramic view of the mall atrium while riding in these extremely quiet, energy-efficient Gen2 elevators. In fact, these elevators also became one of the major attractions to the mall visitors due to their aesthetic appeal.

A bank of elevators

# Workshop on Fire Lifts

by Snehal Toralkar

"What is so special about this workshop on fire lifts?" This must be the thought going through readers' minds. This event was special and important; not only from the elevator industry's perspective, but also from the perspective of the end users – the firefighting personnel. The workshop was held on February 3, the first day of the International Elevator and Escalator Expo (IEE Expo) was at the Bombay Exhibition Center in Goregaon, in Mumbai. There were more than 100 registered for this event.

The purpose of this workshop takes me to an accident that took place six months ago, on the first day of Diwali. Six firefighters on an operation to put out a fire at a flat on the 14th floor of a residential building were found dead in the elevator they had taken in a rush to fulfill their responsibility. This accident raised public concern about high-rise building safety systems. The media reported its own assumptions, adding more panic to the minds of the public.

With the concerns and divergent views involved, the Maharashtra Public Works Department (PWD) appointed experts from TAK Consulting in order to investigate and give their opinions on the incident. Afterward, TAK Mathews realized the gaps in the whole process and took steps to organize this workshop. He realized that an open discussion was needed between the elevator suppliers and fire authorities to establish an understanding of their needs and requirements during the rescue operation and, of course, the PWD statutory authorities. In addition, building developers, consultants and architects need to be educated on the needs and safety requirements by incorporating them into their designs.

Considering these issues, the Workshop on Fire Lifts, which took place concurrently with the IEE Expo 2010, was an excellent idea and provided an opportunity to take serious steps for further change. It is to the credit of the organizers of the Expo, Anitha Raghunath and G. Raghu, who did not hesitate to adjust the expo schedule in order to accommodate this workshop.

The attendees included renowned developers, architects and consultants in the elevator industry, and fire personnel and statutory authorities from around the country.

The workshop started at around 11:30 a.m. with Mathews welcoming the participants. He thanked M.V. Deshmukh (the main architect of the workshop) and the organizers of the expo for their commitment to the elevator industry. He then introduced the workshop and its structure. On behalf of the audience, Mathews also took the opportunity to thank the firemen for their selfless sacrifice to society. Each fireman at the workshop was presented flowers as a token of appreciation.

After this introduction, R.R. Iyer, currently working as the management consultant for various industries shared his experiences garnered from his more than 30 years experience in the elevator industry. Iyer emphasized the

Continued

*Expo panelists*

*Firemen being honored for their sacrifices*

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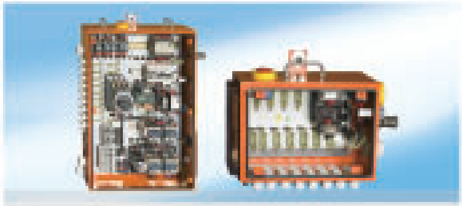
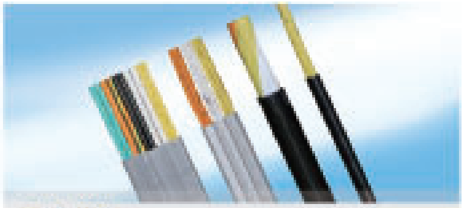


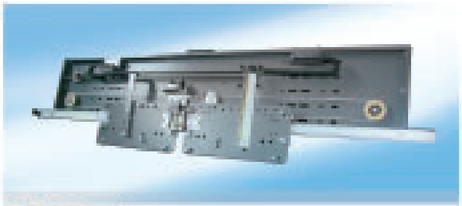
**Escalator**
Checking running loop by program;
VVVF controller.

**Shaft Components**
Accord with safety standard, easy for installing the parts at car top, pit, shaft, machine room.



**Cables&Wires**
Using for transmitting kinds of signal.

**Harness**
Assembly the cables and wires according to the customer's request.



**Door Operator**
VVVF Asynchronous
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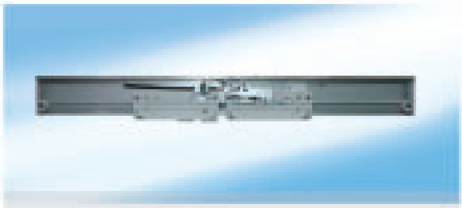

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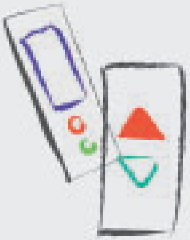

need to upgrade codes and develop a standard operating procedure for fire authorities. Mathews then took participants through the requirements for fire lifts specified in National Building Code (NBC) 2005, Part 4 and Part 8, Section 5. This review was to understand what the code mentions about fire lifts and the issues and gaps involved.

The workshop picked up pace when the experts from various states sat for the Open Panel Discussions. Deshmukh, director of Fire and Emergency Services and fire advisor, Government of Maharashtra; S.K. Dheri, V. Suresh, vice chairman of NBC 2005; S. Veeramani and M. Namasivayam expressed their views and experiences about the fire incidents and the necessary changes that need to be made. There were also discussions with architects, developers and consultants about issues in which they are actively involved.

As the fire-resistance property for doors is an important factor involved, a presentation on this topic was also organized. Sergio Biglino from the Wittur Group delivered this presentation, and gave details about fire rating, definition, testing and methodology as per the norms set out by the European Community and in EN81-72.

After lunch, attendees were divided into four groups for discussions on topics pertaining to fire lifts. Group one discussed issues pertaining to fire lifts, number capacity, speed by building type, and size and height of buildings. Group two talked about issues involving pressurization and sprinkler norms and application (by building type, size and height), lift lobbies, hoistways and refuge area norms. Group three discussed fire lift operation, phases I and II and the standard operating procedure. The final group covered issues related to fire resistance, norms for lift doors, lobby doors, hoistway walls and landing lift components.

Discussions were carried out by each of the groups, and necessary changes were highlighted by the groups' representatives. It was also pointed out that, depending upon building structure; necessary standard operating procedure is to be laid out. Uday Tatkare, chief fire officer


*R.R. Iyer*


*M.V. Deshmukh*


*S.K. Dheri*


*V. Suresh*

in Mumbai, talked about the existing standard operating procedure in Mumbai.

Dheri followed Tatkare's discussion by adding:

*"I think the work done by all the different groups has been quite conclusive. What we need, basically, is to consolidate it in one document of recommendation. And this document of recommendation should be sent to [the] Bureau of Indian Standards. And we will try to get it incorporated in Part IV. Truly, this will take some time for the necessary approvals to happen. But, I think there shouldn't be any problem in adopting these particular minutes, as I am personally involved in this process. There shouldn't be any difficulty in adopting them into the new code."*

At the close of the workshop, T.Bruce MacKinnon, executive vice president and chief operating officer of Elevator World, Inc., reiterated EW's commitment to India. MacKinnon presented the representatives from the various state fire authorities at the workshop with the books *Emergency Evacuation Elevator Systems Guideline* by the Council on Tall Buildings and Urban Habitat, *Elevator and Escalator Rescue* by Theodore Lee Jarboe and John O. Donoghue, and *Firefighting Operations in High Rise and Stand Pipe Equipped Buildings* by David M. McGrail. MacKinnon also assured the audience that many books related to fire rescue, evacuation and the maintenance of elevators will be made available in India.

Continued


*S. Veeramani*


*M. Namasivayam*


*Sergio Biglino*


*Uday Tatkare*


*The breakout discussion groups*

# your residential elevator

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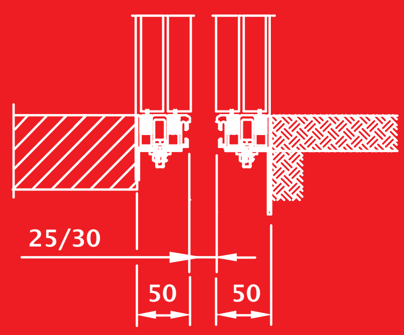


| | |
|---|---|
| Door 2AT | 600/950 mm |
| Door 4AO | 600/950 mm |
| Pit | 120 mm |
| Headroom | 2,650 mm |
| 1 entrance | |
| 2 opposite entrances | |

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*MacKinnon presents donations to state fire authority representatives.*

As a whole, this workshop was pathbreaking, as it brought together policy makers, implementers and end users in a single forum that has initiated a new beginning in this important topic.

**Snehal Toralkar** is a design consultant with TAK Consulting Pvt. Ltd., where she is involved in the designing and specifying of elevators. Prior to joining TAK Consulting, she worked with Schindler India as a design engineer and was involved in the launch of the S3300/5300 products. She has a degree in Mechanical Engineering and more than five years of experience in the elevator industry.

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# Reaction to Fire Workshop

I would like to be a little critical, not because of your faithful efforts, but because of our conservative patterns at large. We can agree that perhaps without dispute that our emphasis on R&D is very poor, generally in every field and extraordinarily poor in fire services. I have been chief fire officer for about 20 years, supervising various divisions consisting of many districts, having 50-60 fire stations, with a Bachelor of Engineering degree. On this basis, I would like to mention that the opinion of a chief fire officer or any other fire-department official cannot be a substitute of an indication projected through case studies. This is the basic lacuna of such workshops and their recommendations, which are not well supported by R&D findings.

Some other issues that did not meet their destination during deliberations are:

- Aesthetics should never be considered over and above the considerations of minimum life safety standards.
- Alternate solutions should never impede functioning or availability of natural/manual means, which is the last resort for life safety.
- Codes are codified by taking onsite life safety requirements into consideration and thereby framing standards with the help of available engineering parameters, which has to be associated with the scientific and logical explanation. Hence it is of paramount importance that every code needs to be decoded accordingly to meet the practical response of an emergency situation. Obviously codification needs to be linked more closely with R&D.

The outcome of the workshop may have been a recommendation for Business Information System and fire departments to make provisions for mandatory case studies of actual fire accidents, for projecting implications of adopted norms. Also, the lift manufacturers should do something to bring their standards closer to the actual accident situation in terms of technical, psychological, environmental and local requirements. Otherwise, we will keep on serving half-cooked dishes. However, your efforts and spirit cannot be devalued, but rather appreciated for creating such a platform where I, along with many, have had this opportunity to put up their contentions for a public cause.

*J.K. Singh*
*Chief Fire Officer/vice principal,*
*UP State Fire Training College*

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# Analysis of Elevator Ride Quality and Vibration

by Gregory P. Lorsbach

Presented at the IEE EXPO 2010 CONFERENCE

**Gregory P. Lorsbach** is president of and a geophysicist with Physical Measurement Technologies, Inc.

## Introduction

The measurement of elevator ride quality (ride comfort) has become an important subject within the elevator industry. It is now often part of specifications for new and modernized elevator systems. It is also a competitive issue for elevator manufacturing, installation and maintenance companies, because it is a strong indicator of the quality of design (overall structure and components), installation and service of the elevator systems. Additionally, the analysis of vibration and sound that has been collected for ride quality measurements provides the ability to diagnose the function of elevator and escalator system components.

How ride quality is measured strongly affects the results of those measurements. Based on extensive work performed by companies from around the world, an international standard was developed for the measurement of elevator ride quality. The standard is *ISO 18738 Lifts (Elevators) – Measurement of Lift Ride Quality*. ISO 18738 establishes the requirements, methodology and processing techniques required to standardize the measurement and evaluation of elevator ride quality and performance characteristics including acceleration, velocity and jerk. This standard does not try to establish what is or is not acceptable in terms of ride quality. Practically, acceptability has to be considered a moving target. The technology and techniques to provide "good" ride quality will change (hopefully for the better) over time.

Utilizing the standard offers the ability to evaluate and troubleshoot using vibration and sound to identify problem areas and improve ride quality. It is important to remember that we are not simply evaluating vibration and sound, but the vibration and sound that relates to ride quality (i.e., human response to that vibration and sound). This means that we are evaluating vibration that was collected in a specific way and analyzed using specified techniques.

## The Vibration Record

### *First-Order Analysis – Troubleshooting*

Data as collected by an instrument may or may not be related to how people feel that vibration, depending upon how the data were processed. For example, Figure 1 displays the vibration and sound level as collected by an EVA-625 prior to processing for ride quality evaluation. Although this is a graphical representation of sound level and accelerometer outputs, the elevator industry generally distinguishes between acceleration and vibration based on the net motion of the car. The evaluation of vibration with respect to human response requires that data as collected by the instrument be weighted (filtered), utilizing the whole-body weighting (Figure 2) as specified in ISO 8041. Paying special note to the weightings in Figure 2, it is clear that people are most responsive to 1-2-Hz vibration frequencies in the horizontal directions (x and y), with sensitivity dropping off at higher and lower frequencies. In the vertical direction (z), we are most sensitive to 5-8-Hz vibration frequencies, with human response dropping off at higher and lower frequencies. This has important ramifications from a design standpoint. In the simplest sense, structure design and component choices can be made so as to minimize vibration at frequencies most readily felt and heard.

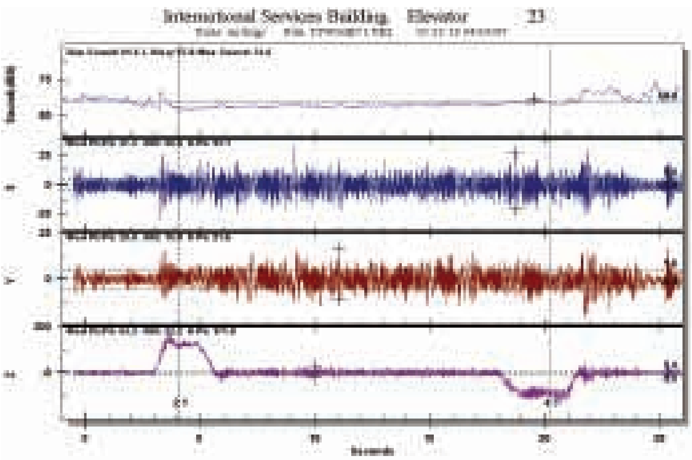


*Figure 1: Displayed from top to bottom are sound level, x-axis acceleration (front to back), y-axis acceleration (side to side) and z-axis acceleration (vertical) time histories.*

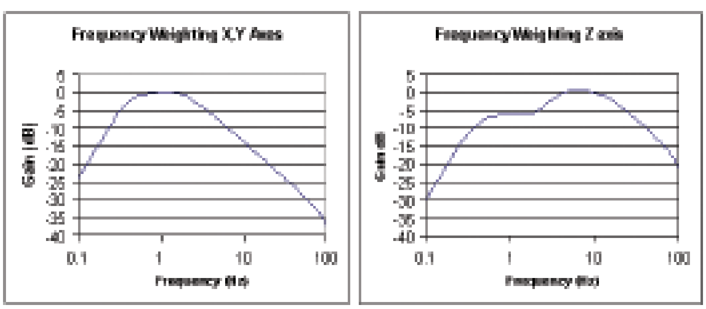


*Figure 2: Whole-body frequency weighting*

Figure 3 represents the data after it has been processed according to the International Organization of Standardization (ISO) standard and is used to evaluate elevator ride quality. This allows the direct diagnosis of problems that have a negative effect on ride quality. The data that has been processed according to the standard is intended to give meaning, such that an increase in the level of vibration corresponds to an increase in the perception of that vibration.

Although measurement and analysis provide a complete standardized evaluation of performance characteristics of an elevator system, a limited analysis of the vibration at full speed will be made for the purposes of this discussion. Vibration is characterized in terms of the maximum peak-to-peak vibration, and the A95 (typical vibration) between the points that an elevator has traveled 0.5 m from its start position, through to the point at which an elevator has traveled to within 0.5 m of its final position. The units typically used in evaluating vibration are milli(g)s. Bear in mind that vibration is a result of both the moving and control elements that make up an elevator system.

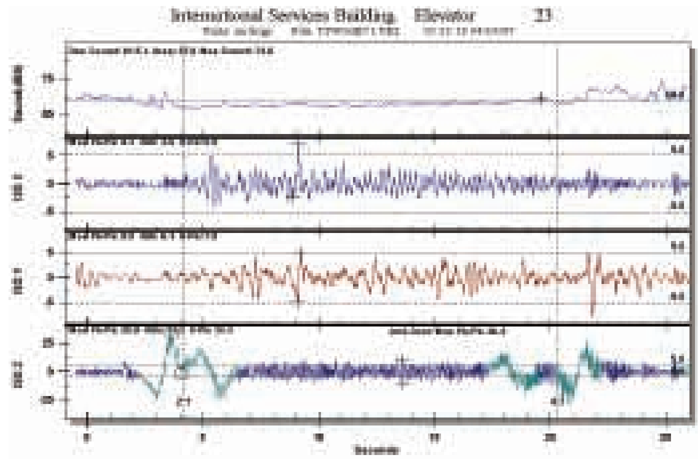


*Figure 3: Data used to evaluate elevator ride quality after it has been processed according to the ISO standard*

When attempting to evaluate the function of the components of an elevator system, the first approach is to conduct a first-order analysis based on a few simple questions:

1) Is the vibration acceptable?
2) Does the problematic vibration show up in the horizontal axes or vertical axis?
3) Is the vibration impulsive or continuous?

*1) Acceptable Vibration*

As a worldwide supplier for ride quality instrumentation, I am often asked what is considered "a good vibration level." This question is not easily answered. What is acceptable from a vibration-level standpoint is based on many factors. A primary factor is a competitive issue with respect to the expectations of the local market. Realistically, every elevator company manufactures a system that causes a box to move up and down in response to traffic requirements. Competitive pressures keep the costs for equivalent functionality approximately the same. However, the motion and sound that a rider perceives correlate with the perception of the quality of design, installation and maintenance. It has been my experience that the maximum acceptable (good) vibration level for new or modernized elevators is less than 12 milli(g)s maximum peak to peak, and less than half that for the A95 (typical) peak to peak. It is not uncommon (and therefore achievable) for the maximum peak-to-peak vibration to be less than 10 milli(g)s, and the A95 peak-to-peak vibration to be less than 5 milli(g)s for high-speed elevators. Certainly, there is a relationship to cost. I will often suggest that the user measures an elevator that he or she considers acceptable. Using that data, the user can create internal benchmarks for acceptability.

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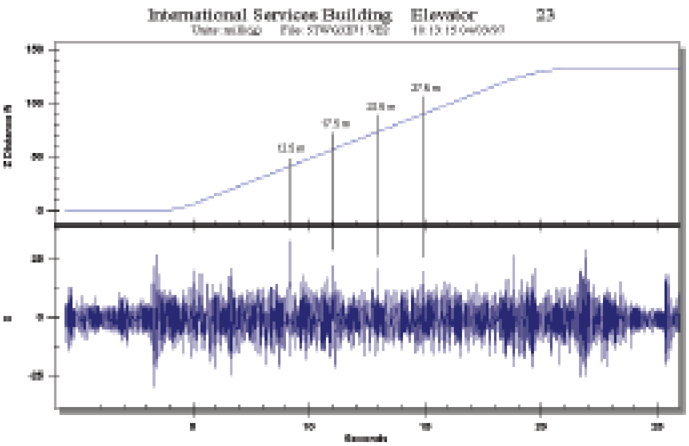


*Figure 4: Distance traveled over time*

*2) Horizontal or Vertical*

This is an important question, since vibration sources can be identified based on the axis that is being affected. Knowing the axes affected allows the user to quickly eliminate possible vibration sources. The potential horizontal-axis vibration sources are rail misalignment and/or roller or slide guides. The vertical-axis vibration sources are ropes, sheave, machine, controller/drive or counterweight.

*3) Impulsive or Continuous*

As we inspect the unfiltered x-axis time history closer, with respect to distance traveled (Figure 4), it is apparent that there is a series of bumps. Using the EVA Vibration Analysis Tools software, it is determined that the bumps are separated by one rail length (located at 12.5, 17.5, 22.5 and 27.5 m from the point at which the elevator started). This would lead one to the conclusion that there are misalignments at those points (one rail length apart) that are causing excess vibration. However, this is the vibration sensed by the EVA-625. When addressing ride quality, it is desirable to address the vibration that people feel.

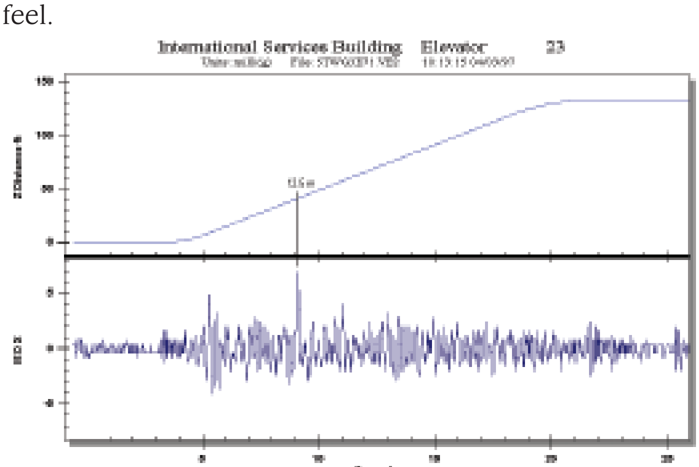


*Figure 5: Distance traveled over time, filtered using the specified ISO standard on lift ride quality filter*

Figure 5 shows the same record after filtering using the filter specified in the ISO standard on lift ride quality. Clearly, the signal is very different, since the apparent bumps located at 17.5, 22.5 and 27.5 m in the unfiltered data are no longer readily apparent, while the bump located at 12.5 m is clearly visible. This approach allows the maintenance company to address the vibration that a rider would feel and not waste time on vibration that people do not feel. This is an example of impulsive motion. When dealing with impulsive vibration in the horizontal axis, it is usually safe to conclude that it is related to a specific location in the hoistway. Fortunately, the use of the EVA Elevator/Escalator Vibration Analysis Tools software allows the user to precisely locate the bumps in the hoistway.

When addressing continuous vibration, the question of horizontal or vertical remains important. Continuous horizontal vibration is either the result of something that affects the entire hoistway (e.g., rail misalignment), or the source of vibration is traveling with the elevator (e.g., rollers). In the most general sense, horizontal vibration sources are located within the hoistway or even on the car.

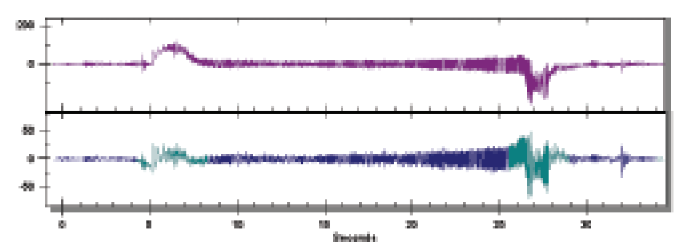

*Figure 6: The upper portion of this table shows acceleration for reference, while the lower portion is the ISO-filtered data used for ride quality measurements.*

Some of the sources of continuous vertical vibration are related to the ropes, sheave, machine, controller or counterweight. Referring to Figure 6, the vertical-axis continuous vibration is readily apparent. It is clear that there is a strong vertical vibration throughout the record. However, the vibration level greatly increases as the elevator travels from the bottom floor to the top floor. We often use the Fast Fourier Transform (FFT) vibration-level-versus-frequency tool to perform a second-order analysis when finding the source of vibration.

**Second-Order Analysis**

When discussing continuous vibration, we often refer to vibration resulting from rotating elements. (A series of impulsive events can also be called continuous.) The driving elements of an elevator have a number of rotating components, including the sheaves, motor and gears within the gearbox. Problems in these areas can have a significant effect on vertical vibration level and ride quality. Each of those can be characterized by a rotational frequency. The rotational frequency can be calculated by finding the diameter of the element (via direct measurement) and the speed of the elevator (via EVA-625 data analysis). As an example, assuming a 400-mm sheave diameter (*d*) and 6-mps elevator (*v*), the rotational frequency (*f*) is calculated such that:

$d$ = 400 mm = 0.4 m

$v$ = 6 mps

Circumference ($C$) = $\pi d$ = 3.14159 X (0.4 m) = 1.2566 m

Sheave Rotational Frequency = $v/C$ = 6/1.2566 = 4.77 rotations per second = 4.77 Hz (≅4.75)

If the FFT (spectrum) of the vertical-axis vibration signal indicates significant energy at about 4.75 Hz, then we can correlate that with the sheave. It is also important to realize that this would be the fundamental frequency and that some higher-order harmonics may also be present (i.e., 9.5, 14.25, 19 Hz, etc.), as well. The same approach can be applied to such components as guide rollers. Additionally, the motor/worm/ring gear rotational frequencies may be identified in the vertical-axis vibration signal.

A good example of using the FFT is demonstrated (again referring to Figure 6 and with a speed of 2.5 mps, geared). It is obvious that the vibration level increases as the car travels from bottom to top. The lower portion of Figure 6 indicates that the perception of that vibration increases, as well. The first thought upon arriving at this site was that the vertical vibration was related to the ropes. Had this been the case, however, there would likely have been a significant change in frequency, as analyzed through the FFT.

If one imagines a guitar string with a constant tension, as the string gets shorter, the frequency would increase. To test this, the FFT was used to evaluate the frequency content of the signal at different points during the trip (Figure 7). The spectrum of the vertical axis (Figure 8), just after the elevator reaches full speed, indicates that the dominant frequency is about 26.5 Hz. About halfway through the trip, the dominant frequency is still about 26.5 Hertz (Figure 9), although the amplitude has increased by about 150%. Just prior to deceleration, nearly at the top, the dominant frequency remains at about 26.5

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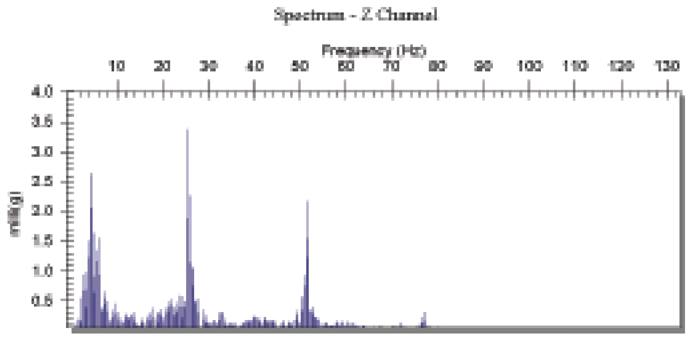


Figure 8

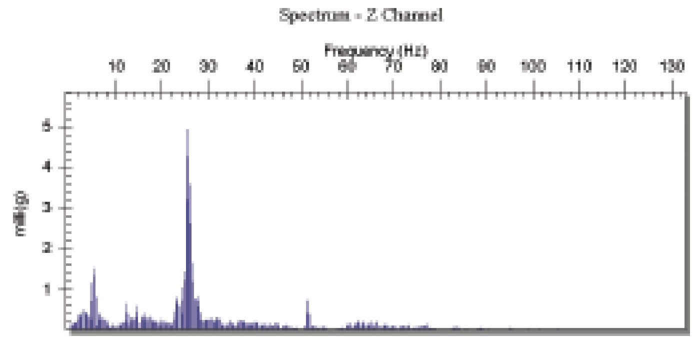


Figure 9

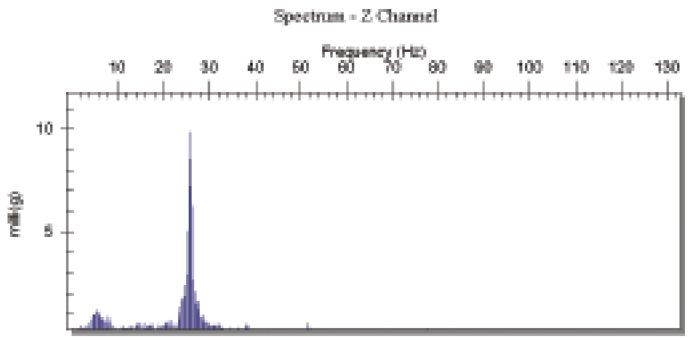


Figure 10

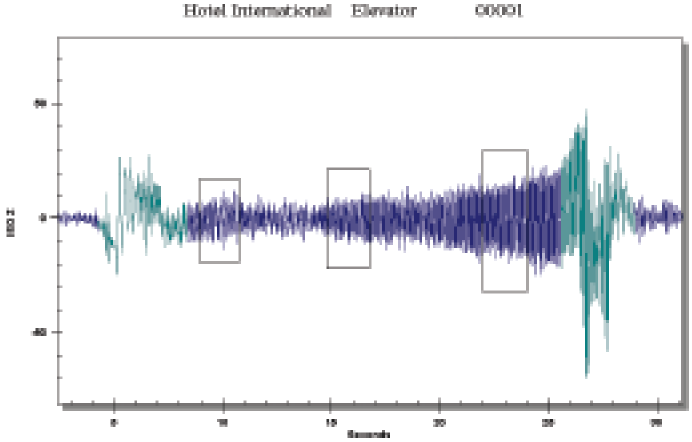


*Figure 7: Frequency of the signal at different points in the trip*

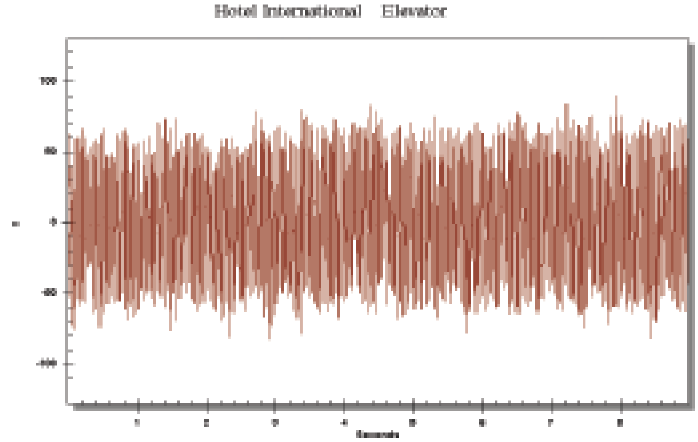


Figure 11

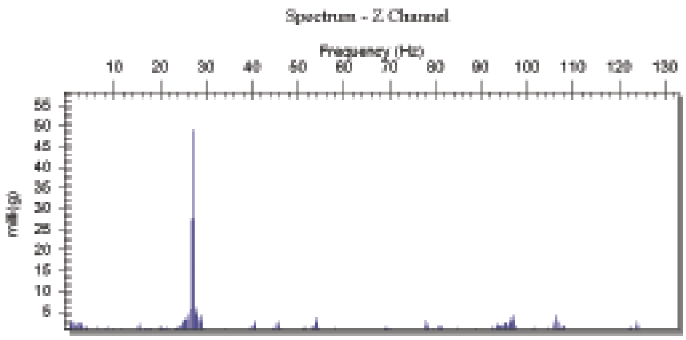


*Figure 12*

Hz (Figure 10), but the amplitude has tripled. This indicates that there has been no significant change in the frequency of vibration as the elevator traveled from the bottom to the top of the hoistway. Using this approach, the ropes and sheave can be eliminated. The next step was to attach the EVA-625 accelerometer directly to the gearbox and make a measurement while the elevator was moving.

Analyzing the vibration signal (Figure 11), the spectrum (Figure 12) indicates that the dominant frequency was about 27 Hz, or nearly the same as that measured on the floor of the car. This allows us to conclude that the source of the vibration (and poor ride quality) was the machine (gear mesh frequency).

**Conclusion**

It is important to remember that successful field personnel within the elevator industry are necessarily clever and analytical (problem solvers). Although they may have not been exposed to vibration analysis as part of their education or experience, they can apply basic and powerful techniques to analyze vibration and quickly evaluate the condition of most elements of an elevator system. Furthermore, it is a simple matter to determine if repairs or changes that had been made to an elevator had the desired effect of improving ride quality.

Additionally, there is significant value to evaluating ride quality prior to the turnover on new installations to establish a "fingerprint" for that installation and to measure before and after modernization to determine what may be required from a bidding standpoint and establishing the improvement for the customer after completion.

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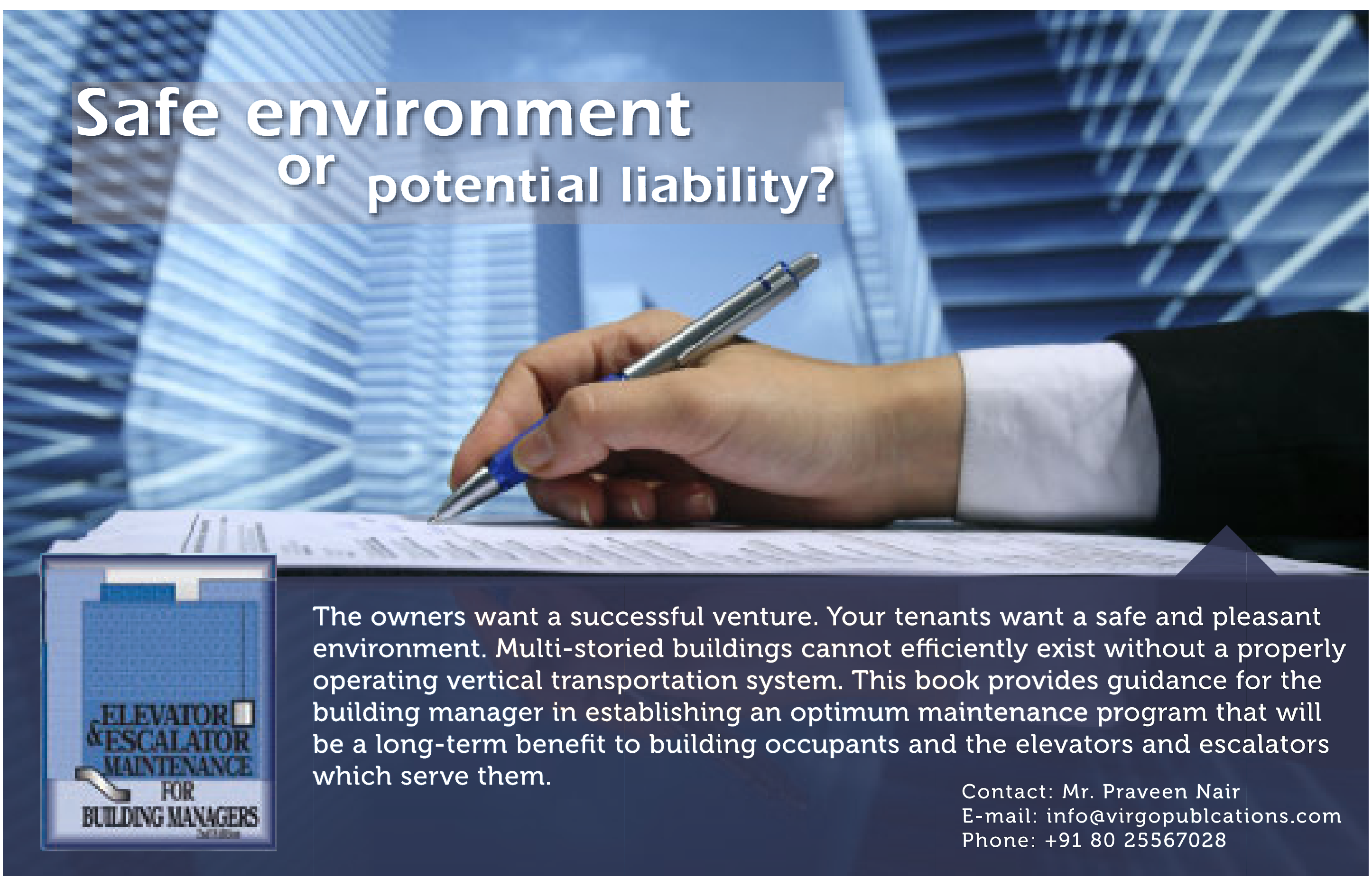

# HOW OFTEN HAVE YOU NOT HEARD OF SAFE DRIVING PRACTICES...
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The primary objective of the Trust, which will have advisory and process support from global bodies like EESF and Elevator World (EW) will be to:

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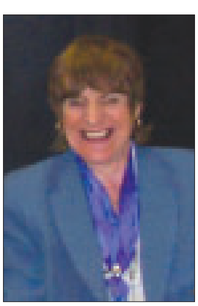
# Energy Efficiency of Lift Systems - A Proposal for Energy Classification

by Dr-Eur.Ing Gina Barney



**Dr. Gina Barney,** Gina Barney Associates, has been a member of the British Standards Institution (BSI) lift committees since 1992 and is a member of TC178/WG10 the international committee responsible for writing standards for the energy efficiency of lifts. The opinions expressed here are her own. She can be contacted at website: www.liftconsulting.org.

**The ISO/DIS25745-1 Reference Cycle**

The ISO/TC176/WG10 committee has been working on energy efficiency standards for some years and has published ISO/DIS25745-1 for comment. This standard specifies the measurement of the running energy consumed by a lift when making a reference cycle and during standby.

The ISO/DIS25745-1 reference cycle obtains a running energy expenditure value for the movement of an empty car from the bottom terminal floor to the top terminal floor and back to the bottom terminal floor, including door operations (or *vice versa*). The total running energy consumed is made up of four components:

1) Energy to travel from the bottom terminal floor to the top terminal floor
2) Energy consumed when the lift is stationary at the top terminal floor including that used to operate the doors
3) Energy to travel from the top terminal floor to the bottom terminal floor
4) Energy consumed when the lift is stationary at the bottom terminal floor including that used to operate the doors.

The running energy consumed per reference cycle is presented in mWh.

The International Organization of Standards (ISO) Reference Cycle relates the rated load and the travel distance from terminal floor to terminal floor to the actual running energy consumed (i.e., the dynamic situation). The benefit of running between terminal floors is its simplicity (i.e., no test weights to carry about).

The ISO Reference Cycle running energy measurement uses an empty car again for simplicity. Simulation work carried for a number of different installations showed over any daily period of 24 hours that the car load averages at 8% of rated load. Thus the empty car ISO measurement procedure is very close to real world conditions. If the running energy consumption is normalized it can allow comparisons to be made between different tenders for new systems or when upgrading is being considered

**Normalizing the Reference Cycle**

An idea for normalization for the energy consumed by a lift was first proposed by Lam, So and Ng in 2006. They divided the total energy used (in Joules) over a known period of time by the rated load of the lift and the distance traveled in the known period of time. Energy was given in Joules (J), which is equivalent to Watt seconds (Ws).

Relating this to the ISO reference cycle gives:

$$E_{sprun} = \frac{E_{rc}}{Q \times S_h} \qquad (1)$$

where: $E_{sprun}$ is the specific running energy consumed in mWh/kgm for a single reference cycle

- *Erc* is the running energy consumed for a single reference cycle to ISO25745-1 in mWh
- *Q* rated load in kg
- *Sh* is twice the travel height between the bottom and top terminal floors in meters

This normalization method is a good one as it relates the load carried over a travel distance to the running energy consumed, i.e., the dynamic situation[1]. It gives an explicit value to the lift system with reference to the building in which it is installed. The same equipment installed in different buildings may produce different values. The playing field is level, as all lift suppliers will face the same effect.

Normalized values of running energy consumption can allow comparisons to be made between different tenders for new systems or when upgrading is being considered

**A Proposal for a Classification System for Lifts**

White goods, boilers, etc. carry energy classification labels with bands A (excellent) to G (unacceptable). The measurements that are made are based on defined situations. For example, a washing machine is measured for a 60°C cotton wash cycle. This measurement situation has its analogue in the ISO reference cycle. The classification bands are linearly presented.

***Energy Class for Running***

For lifts, what values should be given to the bands, in order to represent the running (dynamic) efficiency of a lift? Here is a possible method.

Consider a traction lift.

Ideal motor rating[2] $= \frac{0.981kQv}{100\eta}$ (2)

where:

- $Q$ Rated load (kg)
- $k$ balance
- $s$ travel (m)
- $v$ rated speed (mps)
- $\eta$ system efficiency (decimal)

Time to travel down (only using energy going down, ignore energy traveling up)

$= \frac{s}{v}$ (travel distance [s] divided by rated speed [v])

Specific running energy in kWs

$= \frac{0.981kQv}{100\eta}\frac{s}{v}$ (motor rating multiplied by time)

Convert kWs to mWh multiply by $\frac{10^6}{3600}$

Normalize by dividing by rated load ($Q$) and total travel $(S_h = 2_s)$

$$= \frac{0.981kQv}{100\eta}\frac{s}{v}\frac{1}{2Qs}\frac{10^6}{3600}$$

Simplifying: Specific running energy

$= \frac{98.1k}{72\eta}$ (3)

For 100% efficient systems and a lift with 50% balancing ($k$ = 0.5), the specific running energy would be 0.68. For a lift with 40% balancing ($k$ = 0.6), the specific running energy would be 0.82.

The energy for the door operations is not included in the above calculation. Increase values by, say, 5% to 0.72 and 0.86 (rounded). But these values are for a 100% efficient system ($\eta$ = 1.0)! Suppose a lift was 90% efficient, then the specific running energy would be 0.8 (=0.72/0.90) for 50% balancing and 0.96 for 40% balancing.

Generally, energy label bands are linear on white goods and building certificates. Suppose the running efficiency bands linearly increase by 10% per band then using Equation 3, Bands A to G are as shown in Table 1. Band G would be for very inefficient lifts. Continued

| Classification | Specific Running energy (50% balancing) | Specific running energy (40% balancing) | Running efficiency |
|---|---|---|---|
| A | 0.80 | 0.96 | 90% |
| B | 0.90 | 1.08 | 80% |
| C | 1.03 | 1.23 | 70% |
| D | 1.20 | 1.43 | 60% |
| E | 1.44 | 1.72 | 50% |
| F | 1.80 | 2.15 | 40% |
| G | >1.80 | >2.15 | <40% |

*Table 1: Energy class for running*

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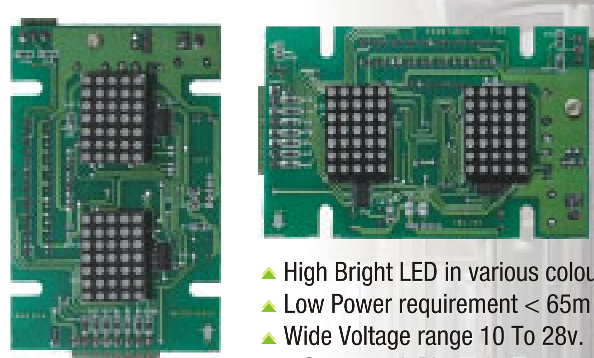
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Table 1 shows 40% and 50% balancing and Figure 1 graphically shows a range of values.

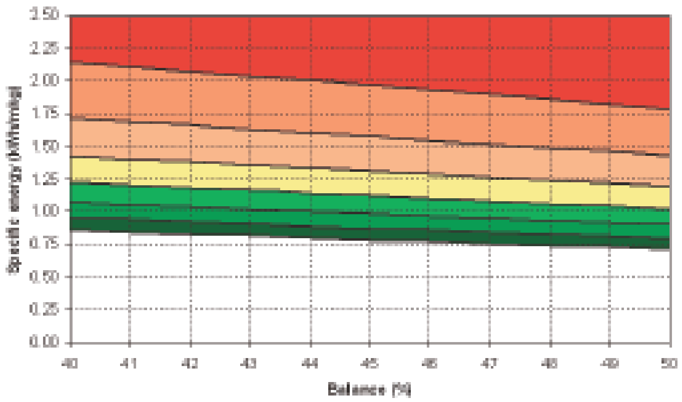


*Figure 1: Classification of lifts according to energy bands A-G (Colors as per white goods classifications)*

The calculation in Equation 3 is very simple but relies on a number of assumptions:

1) Energy is only used when the empty car is descending.
2) No energy is used in ascent (counterweight pulls empty car up).
3) The lift runs at rated speed over the whole travel (start-up/stopping ignored).
4) The door operations consume 5% energy.
5) Regeneration is not considered (lifts with regeneration might fall into A or B classes).
6) Applies to balanced traction lifts (to accommodate hydraulic lifts then kQ would be replaced by the total load lifted, i.e., car plus rated load)

Some of these assumptions might balance each other out. In any case, the formula is only used to specify the bands and not to predict any absolute values. Manufacturers would be able, based on their knowledge of their product (test tower or calculation), to provide a value (in mWh/kgm) at tender for a specific building, which can then be checked after commissioning.

| Specific energy (mWh/kgm) | ≤0.80 | ≤0.90 | ≤1.03 | ≤1.20 | ≤1.44 | ≤1.80 | >1.80 |
|---|---|---|---|---|---|---|---|
| Class | A | B | C | D | E | F | G |

*Table 2: Example energy label for running (50% balancing)*

### Energy Class for Standby

What bands could be used to represent the standby (static) efficiency of a lift?

In order to apply a linear banding for standby suppose Class 1 has the value of <100 W and there are linear bands of 100 W up to Class 7 with >600 W. Band 7 would be for very inefficient lifts.

| Power(W) | ≤100 | ≤200 | ≤300 | ≤400 | ≤500 | ≤600 | >600 |
|---|---|---|---|---|---|---|---|
| Class | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

*Table 3: Example energy label for standby*

The banding is linear starting for the Class 1 band at 100 W. This lower value would accommodate many small lifts without the need for any modification. Class 1 might eventually need to be subdivided into 1*, 1**, 1**. The Class 7 band at 600 W would require immediate upgrading.

The Standby Energy bands are numbers to avoid confusion with the Running Energy bands, which are alphabetic. For example, a lift might be identified as **E2** classification.

### Total Specific Energy

There has been a proposal by a group of engineers[3] in Germany that a combined Total Specific Energy could be provided, where the specific running energy is added to the standby energy. They define total specific energy as:

$$E_{spec} = \frac{E_{rc}}{Q \times S_h} + \frac{P_{st} \times t_{st}}{Q \times v \times t_u} \quad (4)$$

where: $E_{spec}$ is total specific energy in mWh/kgm per day
- $E_{rc}$ is the running energy consumed for a single reference cycle to ISO25745-1 in mWh
- $Q$ is the rated load in kg
- $S_h$ is twice the travel height between terminal floors in meters
- $P_{st}$ is the power consumption in standby in W
- $t_{st}$ is time in standby in hours
- $t_u$ is the time running per day
- $v$ is rated speed in mps

The expression ($v$ x $t_u$) is the distance the lift travels per day in meters ($S_u$), then Equation (4):

$$E_{spec} = \frac{E_{run}}{Q \times t_h} + \frac{P_{st} \times t_{st}}{Q \times S_u} \quad (5)$$

This is an attempt to normalize the standby energy consumed so that it can be added to the normalized running energy consumed. Although the units of the two parts of the above equation possess the same dimensions they cannot be added together. The normalization of the running energy (dynamic energy) consumed by dividing it by the rated load and the distance traveled during the reference cycle is reasonable and logical.

However, it is nonsense to take the standby energy (static energy) consumed and then divide it by the rated load and the distance (running) traveled in a day. First, the rated load has no relationship with the standby energy. Two lifts with the same rated load can have different standby demands simply by having different

Continued

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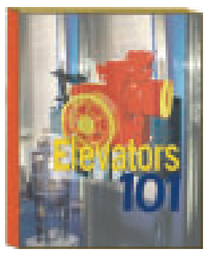
# You can see it in their faces.

# Confidence




by Zack McCain

## Elevators 101

Know the basics and gain the confidence that comes from a better understanding of elevator technology.

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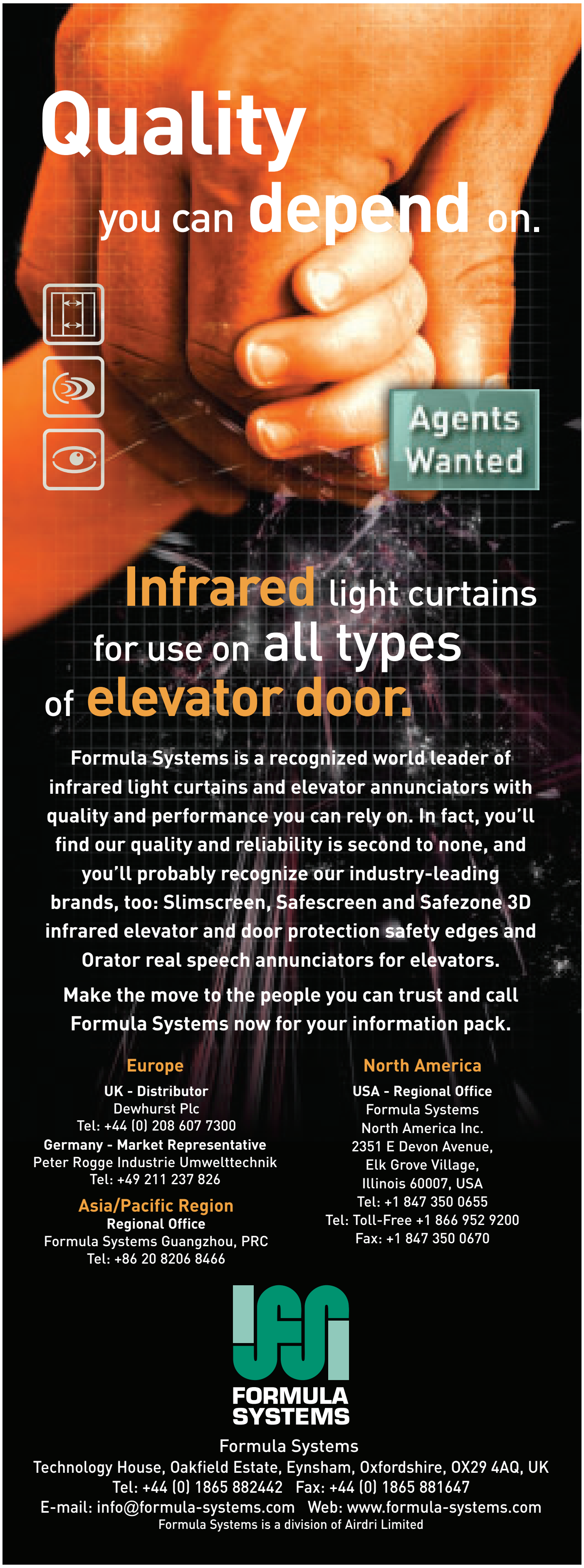


lighting systems in the car. Secondly, if the lift is stationary all day the second term in the equation becomes infinity, as $S_u$ in the denominator is zero.

The application of this proposal to lift classification will result in the inaccurate and unacceptable energy classification of lifts. It is simply bad science.

**An Example of an Energy Plate**

A lift might display an energy plate such as Table 4.

<table>
<tr><td>ENERGY:</td><td>Model</td><td colspan="2">Reference</td><td>Date</td><td>Recheck by</td></tr>
<tr><td>Lift</td><td>Rated load: 1200 kg</td><td colspan="2">Rated speed: 1.0 mps</td><td>Balancing: 50%</td><td>Travel: 8.5 m</td></tr>
<tr><td>Running class</td><td>1.38 mWh/kgm</td><td rowspan="2">E</td><td rowspan="2">2</td><td>140W</td><td>Standby class</td></tr>
<tr><td colspan="2">Based on ISO25745-1 reference cycle</td><td colspan="2">As defined by ISO25745-1</td></tr>
</table>

*Table 4: Illustration lift energy plate*

This illustrates a lift with a specific running energy of 1.38 mWh/kgm and a standby power consumption of 140 W. Then the Energy Class for Running would be **"E"** and the Energy Class for Standby would be **"2"**. The label displayed would be **"E2."**

It should be noted that the plate displays the absolute values of specific running energy and standby energy as well as a classification. This is important as the usage of a lift varies day by day, minute by minute and certainly tenant by tenant. For example, the prediction of a yearly cost is difficult. With these values, the owner can estimate energy consumption against their knowledge of lift usage. Remember that how the lift is used changes its energy consumption, but that its efficiency remains unchanged.

**Finally**

These are just my thoughts. There is still a lot to be done if lifts are to display an energy plate. Worldwide agreement has to be obtained. Some manufacturers would welcome the appearance of an energy plate on their equipment, but others do not. We know why!

ISO working group TC178/WG10 has a difficult task. The working group has to take a wider view than a national standards body or an individual association might take.

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1. See Bos, J: Energy Is Force Distance (ELEVATOR WORLD, October 2009), pg 52.
2. See pg C-14 of Micropedia
3. ELEVATOR WORLD, October 2009, pg 78.

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# IEE Expo 2010

by Prabodh Hamilton

There were many thoughts, comments and critical statements that questioned whether it made sense to hold such an exhibition during these times of economic downturn. The Indian economy had seen its fair share of jerks, starts and rattling that could be experienced in a bad elevator ride. Though the smaller Tech Forum held in Chennai in February 2009 right after the Lehman Brothers debacle was a success, questions were raised on the wisdom behind scheduling a larger-scale expo, despite the evident signs of global economic recovery. While India had managed to remain relatively unscathed through the economic bloodbath, some regulars at the previous events conveyed their decision to back out based on the global scenario. Yet, International Elevator and Escalator (IEE) Expo organizer Virgo Communications (led by Anitha Raghunath and G. Raghu), with advisor TAK Consulting, refused to be discouraged. The decision was helped by early input from the Study of the Indian Elevator and Escalator Market conducted by eResearch that indicated that the Indian industry market was on an upswing. The third edition of the expo was thus set for February 3-5 at the largest hall of the Bombay Exhibition Centre, Mumbai.

*Top: M.V. Deshmukh cuts the entry ribbon to begin IEE Expo 2010.*

*Bottom: The lighting of the ceremonial lamp*

The previous two days of preparatory hectic activity mellowed down to a sense of disquiet; what would be the fate of the third edition of the hereto successful expo? However, the queues that had already formed at the venue well before the event was officially opened to the public quickly set to rest any sense of foreboding. The jerks, stops, starts and vibrations were noiselessly cut down.

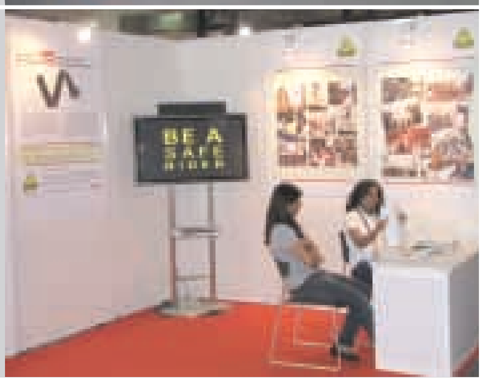
The inauguration team for the expo included President of the Maharashtra Chamber of Housing Industry Pravin Doshi, Vice Chairman of the National Building Code (NBC) 2005 V. Suresh, Convenor of NBC 2005 S.K. Dheri, Director of Maharashtra Fire Services M.V. Deshmukh, Chief Engineer of the Maharashtra Public Works Department S.T. Walekar and Chief Lift Inspector of Maharashtra S.N. Bhasme. The inauguration proceedings began with the lighting of the ceremonial lamp. With cameras flashing, Deshmukh cut the ribbon to formally open IEE Expo 2010.

The magnanimity of the stalls (if they could be called such) and gleaming elevators within gave one a feeling that this was not a temporary setup. Johnson Lifts Pvt. Ltd.'s pavilion, declaring "Proud to

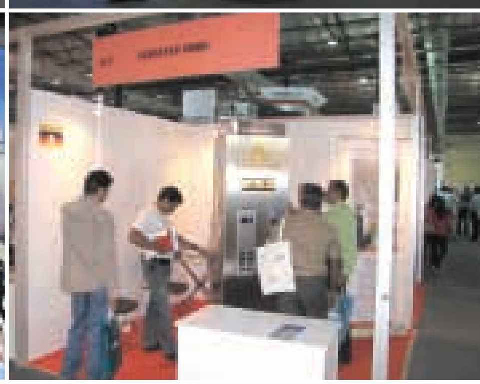
*Continued*

# Exhibitors

# Exhibitors







# IEE Expo 2010

Continued

be Made in India," stared you straight in the face. An operating escalator made in India (the first in over two decades) proudly stood in testimony to the company's proclamation. Toshiba Elevator & Building Systems Corp.'s banner, stating "World's fastest Elevator manufacturer," just could not be ignored. Concord had displayed operational doors that quietly demonstrated the sturdiness of its elevator doors, while City Lifts (with its huge Kinetek permanent-magnet [PM] gearless machine) offered a high-speed product.

The huge stalls of the new entrants to the Indian industry market, like Fermator, Sematic and Wittur, just went further to reaffirm their commitment to India. The dozen suppliers to the hydraulic elevator segment, like Blain, Bucher, GMV Spa, Hydro Pneumatic, Jai Ashapura, Kleemann, Universal and Zagro, stood to demonstrate that they, too, had places in the new "green" world. In fact, Blain's open challenge (made in its "Hydraulic Elevators, Busting the Myths") to the anti-hydraulic campaigners to a debate had no takers. Global guide-rail suppliers Monteferro, Savera, Asray, Marazzi and PMT established that Indian users were becoming more discerning as far as elevator-ride quality was concerned. The joint-venture entities between Indian and foreign players, like Prisma DSA, Hephzi Elevators Pvt. Ltd. and MAS Industries (which were the result of relationships that had been built from the first IEE Expo in 2007), stood as more evidence to the role the IEE Expo was playing in the Indian industry. The presence of representatives from Chinese, German, Italian, Spanish and Turkish industry associations reinforced the importance of the Indian market in the global scenario.

Concurrent workshops and seminars were also conducted to enable in-depth discussion and understanding of detailed topics. The first, on February 3, was a whole-day workshop on fire lifts, followed by a whole-day series of seminars on technical advancements. A special workshop on fire lifts was conducted by TAK Mathews. This was attended by over 100 diverse experts from fire authorities, developers, architects, consultants and the elevator industry. The panel discussion was chaired by Dheri, Suresh, Deshmukh and S. Veeramani. The workshop was a pathfinding effort in bringing together key decision makers.

Day one of the expo concluded with a musical fusion night, which gave the exhibitors a well-deserved opportunity to sit and relax with industry players and enjoy the fusion music from various musical instruments performed by the Green Rhythms, a group of young musicians from Bangalore. The village theme, exotic Indian food and African music made the evening a grand success. Though the intention was that exhibitors would sit down and relax, before long, the beat had everybody on their feet.

The topics (to be published as technical papers in ELEVATOR WORLD India) covered at the February 4 series of technical seminars on latest advancements in the elevator and escalator industry were as follows:

- “Analysis of Elevator Ride Quality and Vibration” by Gregory P. Lorsbach, president, Physical Measurement Technologies
- “Inclined lifts, Another way to the top” by Achim Hütter, managing director, Hütter Aufzüge
- “CANopen in Lifts” by Sudhir Abhyankar, manager operation, Global Technology, Can in Automation, India
- “Hydraulic Elevators – Busting the Myths” by Parag Mehta, Blain Hydraulics

*Continued*


# IEE Expo 2010

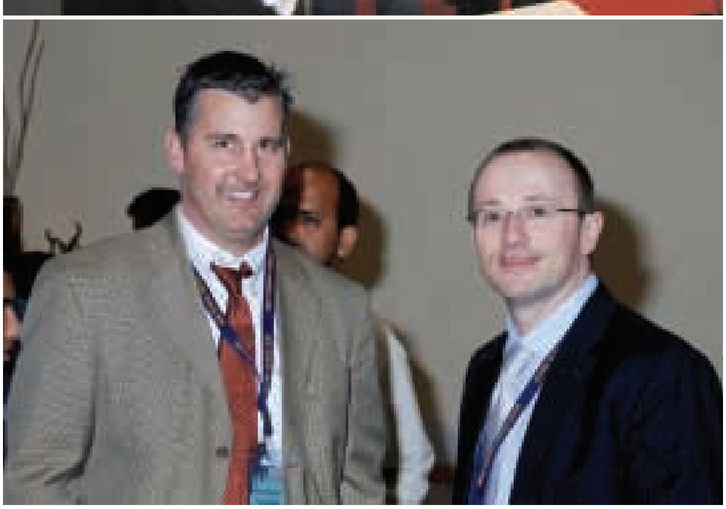
Continued

- "The Elevator Management System: A Nonproprietary Approach" by Dinesh Musalekar, director, TL Jones India
- "Unraveling ACPM Machines" by Gary Ward, vice president of Sales and Marketing, Imperial Electric, and Palvinder Hayer

The three-day expo comprised of 120 exhibitors and drew visitors of over 7,000 people from 30 countries. As day three came to a close and a kind of hush filled the air, it was evident that this was another successfully conducted expo. Such was the success that the suppliers who had decided to withdraw from participating at this edition of expo surely must have regretted their decisions. The comments from Trevor Rodericks, a visitor and veteran of the Indian industry, summed up the expo:

> *"Another successful exhibition; well done and all the very best for the future. India is growing, in its elevator development, in new products, as well as [in] finish. Spade work for the workshop on fire lifts was so thoroughly done by you and your team, there was no ambiguity in your PowerPoint presentation;*


*The musical fusion reception on the first night of the expo featured the Green Rhythms, which kept the excitement of the day going.*



*(l-r) ELEVATOR WORLD's T. Bruce MacKinnon and Achim Hütter of Hütter Aufzüge*

> *well done. Getting all the 'bigwigs' [together] must have been a Herculean task. Keep up the good work that you all have started."*

Virgo Communications has already announced its next events: a Tech Forum in February 2011 in Delhi, followed by the fourth edition of the IEE Expo in Mumbai in February 2012.

**Prabodh Hamilton** is the Business Development director at TAK Consulting Pvt. Ltd. He has more than 17 years of experience in client servicing and business development, licensing. Prior to joining TAK Consulting, he worked at Ogilvy & Mather.

# Toshiba has an International Perspective

by M.J. Mohamed Iqbal

The IEE Expo was well represented by many companies from both India and the other parts of the world, such as Germany, the U.K., Italy, the Netherlands, Switzerland, Turkey, Spain and the U.S. There were not many large multinational companies, like Otis, Mitsubishi Electric, KONE and Schindler, present. However, there was the noticeable presence of Toshiba Elevator.

There were many companies dealing with parts and elevator components such as ropes, automatic doors, control parts, rescue devices, measuring instruments, modernization tools, etc. These companies' booths garnered much attention. Many companies that sell and manufacture electronic components were present, as well. Their booths were well crowded by engineers from various lift companies in India and the Middle East. Eros Elevator Pvt. Ltd., Bharat Bijlee, Heena Engg. Co. and Maxton Group were showing traction machinery and car-parking elevators that attracted a worthy crowd.

The China Pavilion occupied a very big space and was attractive with catalogs in various names. Toshiba Elevator helped provide an international perspective by appearing with a full, dedicated team, including Executive Vice President and Chief Technology Executive Mr. Harada. The company showed a DVD about its Guinness world-record fastest elevator in Taipei 101, which travels at 1,010 mpm. Technocrats and young engineers inquired about this technology and received good answers from design engineers and technologists.

Toshiba Elevators also displayed a miniature model of its double-deck elevator featuring automatic adjustment of floor height by ball screw. It was well demonstrated that double-deck elevators are a mass transportation solution, to keep people moving through high-rise buildings, while also minimizing space used and enhancing operating efficiency. This type of elevator is installed in the Shanghai World Financial Center in Shanghai.

Shunichi Kimura, president and CEO of Toshiba Elevator, set the target before the company's team executives that Toshiba Elevator is to be one in five in global market share by 2015. T.Bruce MacKinnon, EW executive vice president and chief operating officer, interviewed Toshiba Elevator Senior Manager Takashi Sasanuma about new products. Sasanuma told him that Toshiba Elevator had invented the first magnet suspension, in which an elevator will run without touching elevator guide rails, providing high riding comfort. Sasanuma also explained that his company has received an order for a 600-mpm elevator with a capacity of 40 persons in Japan. He said that this is the first of its kind and requires a lot of design parameters. MacKinnon asked whether Toshiba could manufacture an elevator to surpass the speed of its current record holder. Sasanuma replied that it is possible, but that no such inquiries from real-estate developers had been made.

More visitors attended the expo than expected. Most were elevator suppliers, and maintenance and modernization companies. Also this time, the Expo attracted many large builders and their representatives visiting the event. Some attendees were looking to educate themselves on elevator technology. Many of these proved their interest by frequenting the EW stall. Here, they could receive a free *2005 Elevator Industry Field Employees' Safety Handbook.*

This exhibition had more response and attendance than expected. The 2010 iteration of the IEE Expo was a very encouraging one, and until the final hours of the third day, there was a huge crowd.

*(l-r) Takashi Sasanuma, senior manager, Toshiba Elevator, with T.Bruce MacKinnon*

# Unraveling ACPM Machines

by Gary Ward and Palvinder Hayer

*Presented at the* IEE EXPO 2010 CONFERENCE

The intent of this article is to provide a degree of practical education about the AC permanent-magnet (ACPM) synchronous machines that are replacing traditional AC and DC technology in the elevator industry. Much of the content of this article is based on a Kinetek presentation at the 2010 International Elevator & Escalator Expo that took place on February 3-5 in Mumbai.

**Recap**

Looking back to about 1900, large DC machines were the workhorse of the elevator industry. DC machines were available in both geared and gearless machine configurations. DC machine drawbacks included both large size and weight and comparative complexity, affecting both control and maintenance. In approximately 1930, single-speed AC machines began to be widely used with smaller passenger elevators. These machines offered reduced size and complexity, durability and ease of maintenance. Motor/generator sets, entering the market in about 1940, provided the load-lifting capability of the DC motor and surmounted earlier control drawbacks.

DC hoist motors provided a significant second wind when silicon-controlled rectifier (SCR) drives arrived in the 1970s. SCR drives provided excellent control of DC motors, without requiring a generator. They even allowed motor/generator sets to be modernized by simply removing the generator from the circuit. SCR drives suffered from noise and difficulty approximating a clean sine wave, however. In the 1990s, significant progress in AC inverter-drive technology allowed AC motors and machines to expand their usefulness and application, improving their load range and providing smooth control across a wide speed range. However, heavy cars and high speeds continued to provide a market for DC machines.

The ACPM machine appeared in about 1995 and continues to be often regarded as the better choice for most elevator applications. ACPM machines are lighter and smaller than DC machines, provide smooth power across a wide range, are extremely durable and maintenance friendly, and are approximately 35% efficient than comparable AC-induction solutions.

**ACPM Technology**

In ACPM machines, the gearbox (a necessity when using AC-induction motors to lift heavier loads) is eliminated, along with its inefficiency, noise, vibration and gear lubricant leakage. ACPM gearless machines allow heavier loads to be moved at greater speeds – up to 7 mps in 1:1-roped installations or 3.5 mps with 2:1 roping. ACPM machines provide high starting torque without requiring a gearbox.

**Compatibility**

Drives from most major manufacturers are capable of operating ACPM machines. The more sophisticated drives are capable of "learning" the machine's characteristics to establish critical parameters without requiring user data entry. The learning process is intended to ensure the best possible performance for the drive/machine combination. One example of a product with this technology is the new Kinetek Fusion™ integrated elevator control, which combines elevator drive and control logic in a single unit. This device provides advanced learning capabilities for both ACPM and AC induction motors.

**Construction**

The permanent magnets at the heart of ACPM technology are "rare earth" magnets made of iron oxide, bromine and other metal oxides such as hematite and magnetite. These materials are finely ground, and the resulting slurry is formed under extremely high pressure, heated, sintered, formed, ground, polished and, finally, magnetized. Magnets of these materials are also known as "ceramic" magnets and may be ceramic ferrite, neodymium, plastic-bonded neobymium, etc.

Ceramic permanent magnets are electrically nonconductive, cost effective, readily available and able to offer extremely powerful, permanent magnetic fields. These magnets have found applications in DC motors, brushless DC motors, synchronous motors, water pumps, loudspeakers, couplings, water meters and traditional magnetic adherence applications.

**Magnets Specific to ACPM Elevator Machines**

Gearless AC synchronous elevator machines use neodymium ceramic magnets. These magnets are made of a combination of neodymium, iron and boron, and became available in the late 1970s. Characteristics of neodymium magnets include good power in relation to their size, the capability of lifting up to 1,300 times their own mass and relatively high production costs (offset by usability and power factors). Neodymium magnet magnetization is permanent and does not weaken over time.

*ACPM machine load testing*

## History

ACPM motors are field proven in the elevator industry. Since their first appearance in the KONE EcoSpace™ line in 1992, through the Otis Gen2®, and now Kinetek's product line, ACPM motors have proven to be extremely durable, reliable and energy efficient. Importantly, ACPM machines provide a high ride quality across a broad range of acceleration, contract speeds and load requirements.

## About Kinetek

Kinetek is a private U.S.-based manufacturing company employing more than 2,500 people, including over 300 degreed engineers, at 28 global facilities. The company has 13 design centers and provides a broad range of product technology and capabilities. Kinetek serves worldwide markets, with motors, complete machines, drives, controllers, modular controller board sets, uninterruptible-power-supply-based emergency power sources and more.


**Gary Ward** is vice president of Sales and Marketing for Kinetek.

**Palvinder Hayer** is director of Technical Support for Kinetek.


*First tooling parts evaluation*

*ACPM machine construction at Kinetek's factory*

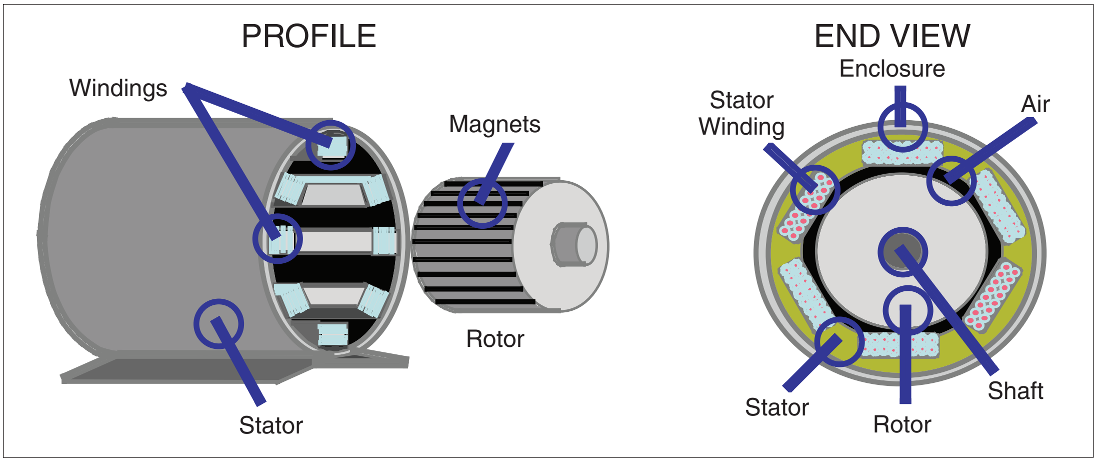



*Figure 1: Three-phase ACPM motors consist of a stator employing electromagnetic windings and a rotor employing neodymium magnets.*

# Fire in High Rise Buildings: The Role of the Elevator

by Rajnikant Lad

The usual warning near elevator entrances, "In Case of Fire Do Not Use Elevator, Use Stairs" needs to be replaced by the more useful warning of "Use the Elevator During Fire under Firemen's Guidance." But to use this warning, we need to study the elevator operation and fire situation in a building. This is not a simple task and cannot be handled or decided by the elevator industry alone. It requires the joint effort of the fire department, town planning department/municipal authority, elevator licensing authority, architect and all other agencies directly or indirectly involved in designing, constructing and maintaining buildings and elevators.

Before going into further detail of the subject, let me explain the reasons for not using the elevator during a building fire:

1) It is very common to switch off the power supply to the building during any fire.
2) Fire or smoke may get into the elevator cabin and endanger the lives of the passengers.
3) The fire/heat due to fire near elevators may damage the equipment, resulting in breakdown.
4) The uncontrolled rush of passengers during emergencies may cause breakdown of the elevator.
5) Water used by fire personnel during fire control may enter the hoistway and damage/short circuit electrical equipment, leading to breakdown.

If we study each above reason and the proposed solutions individually, I am sure our thought process will change. These points and the following will bring all the agencies involved together to rethink the subject and work out some common acceptable design features that will help us make elevator services available during fire in buildings.

**Thoughts on Each Point**

1) Considering the threat of extending the fire, it is a general practice to switch off the supply to the building during a fire. But if the elevator power supply cables are taken separately right from the distribution panel to the elevator control room through the elevator duct, we can run the elevator as long as the fire is not near the hoistway. This is the general practice and a requirement of the lift rules. The use of elevators in fires should be under firemen's control only.
2) During a fire, the smoke will move toward the lower-pressure areas. It may enter the elevator lobby and hoistway. The hoistway will work like a pump, and any movement of the elevator will suck the smoke inside the hoistway, threatening elevator users during a fire.

   The best recommendation is to have the hoistway pressurized to a positive pressure so that the smoke does not enter the hoistway and elevator cabin. In this case, the elevator lobby will also need to be pressurized so that the smoke does not affect passengers gathered near it during rescue operations.

   In fact, pressurization of hoistway and lobby is mentioned in the National Building Code (NBC) 2005, Part 4, Annex C, points g and h. However, pressurization of an elevator system in a building taller than 20 floors building will be a

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great technical and financial exercise. The easiest solution is to have an external elevator for fire use. The elevator lobby would be on the outer side of the main building. With the lobby outside the building, the density of smoke will be less and will not affect passengers much during fire.

3) As per the Lift Act and NBC, the fire lift landing doors shall have one hour of fire resistance, and the lift enclosure shall have two hours of fire resistance. In addition to doors, there are call buttons and position indicators installed near the elevator entrances. If the landing call buttons and position indicators are also made to have at least one hour of fire resistance, then the elevator can be safely used during fire emergencies.

   Another solution would be to have the elevator under firemen's control during fire operation through a switch. The operation of this switch would disconnect all landing calls, and the elevator could be operated from inside the car (only car calls would be accepted). If we modify our control in such a way that upon activation of the fireman's switch, the supply to all landing call buttons and position indicators installed on the floors would be disconnected, the possibility of short circuit through these will be overcome. In this case, there is no need to make landing call buttons and indicators fire resistant.

4) During a fire, everyone will try to reach a safer place as fast a possible. Resultantly, if elevator services are available, there will be a problem of overcrowding/overloading. As per the NBC, for operation of an elevator during a fire, fire-department personnel have control of the elevator's operation. Therefore, if firefighters take the control of the movement of the occupants, elevators can be used very well to carry out the evacuation operation. The fire department should make this procedure part of its rescue training and drill for such a situation.

5) During firefighting operation, a spray of water may enter the hoistway and short circuit the electrical connection of locks, indicators, call buttons and other shaft equipment. It is a general practice to keep the elevator entrance level higher than the floor level so that water does not run into the hoistway. This takes care of water accumulation during regular floor washes. But during firefighting operation, the amount of water flow is much greater.

   As explained in my third point, if we modify our control and disconnect the supply to the landing call button and position indicator on activation of the fireman's control switch, there should be no possibility of short circuit through these. For the landing-door lock contacts and door operator, if we provide covering with a suitable gasket, we can protect water entering these electrical points and avoid short circuit. Additionally, shaft switches and limit switches can be protected with suitable coverings to ensure their functions during water spray. Also, If the fire elevator is provided from outside of the building, the possibility of water detaining elevator operation will be avoided to a great extent.

There will be a number of questions on the above proposals, but if we start working on these lines, we can make complete workable solutions, and the those in the elevator and building industry will be able to display proudly, "Use the Elevator During Fire under Firemen's Guidance."



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*– Ricia Hendrick, Publisher*

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# CiA at the IEE Expo in Mumbai

by Sudhir Abhyankar

The International Elevator & Escalator (IEE Expo) 2010, held in Mumbai on February 3-5, was an impressive show with exhibitors from all over the world. There were companies present from the U.S., Canada, the U.K., Switzerland, Turkey, Spain, Dubai, the Netherlands, Japan, Greece and India.


The CiA booth

CANbus is widely used for elevator and escalator control, with the advantage of a serial bus providing a reduction in wiring. Can in Automation (CiA) representative Global Technology had a booth at the IEE Expo to inform visitors on the latest development trends in elevators and escalators using Controller Area Network (CAN) profiles. Sudhir Abhyankar gave a presentation on CAN/CANopen during the expo. He explained the basics of CAN during his short session by demonstrating how CANopen is useful for elevator applications.

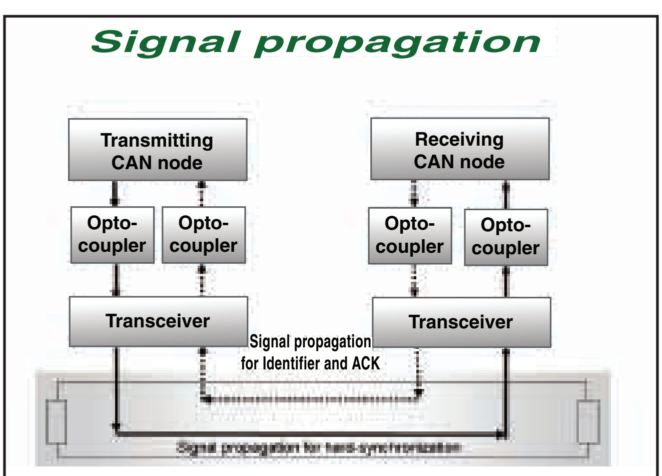


*Figure 1: Typical CAN communication on a two-wire bus*

**Base and Extended CAN-IDS**

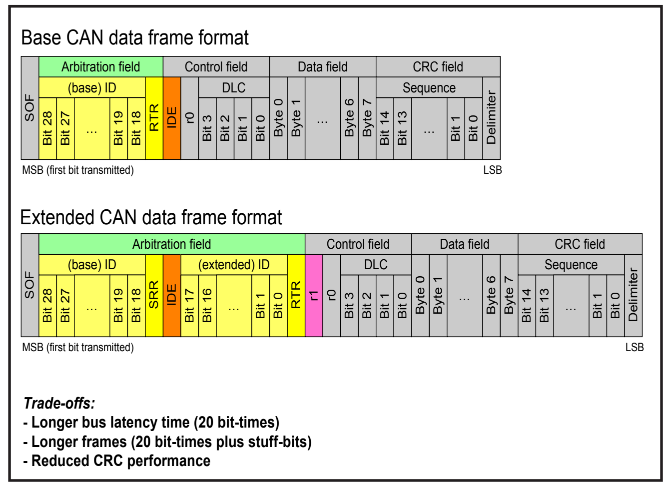


*Figure 2: Base CAN data frame format. MSB (first bit) Extended CAN data frame format. MSB (first bit)*

CAN is a message-driven protocol with a principle to communicate as little as possible. Each message is recognized by 11 identifiers in the basic CAN data frame. This provides a maximum of 2048 messages. Twenty-two-bit identifiers provide more messages with, of course, some tradeoffs (like reduced accuracy of cyclic redundancy check and more time for packet transmission). All of the nodes on CANbus can send and receive messages. Any node that needs to send messages must check the bus availability in order to start sending, while all other nodes go into listening mode. However, if two or more nodes transmit the messages simultaneously, then messages with more priority drop out systematically without losing time.

The receiving node(s) can determine if the current message is meant for it (them). If it is not, the message is ignored. Normally, bidirectional communication between two nodes is seldom needed, except during system initialization. The other powerful features (Figure 3) in the protocol take full care of reliable communication and error detection without time overhead.

The electrical signals on the two-wire bus are converted from transceiver chips to bits, and then assembled by the CAN controllers into CAN packets. The interpretation of the data received in a packet is done with higher-layer protocols, such as the CANopen protocol and the profiles standardized by CiA.

Continued


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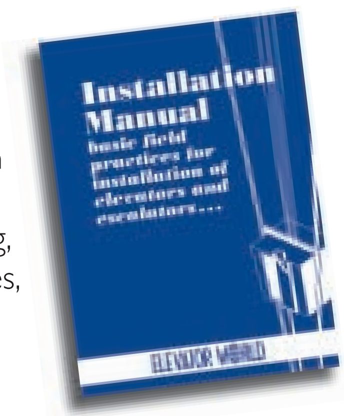


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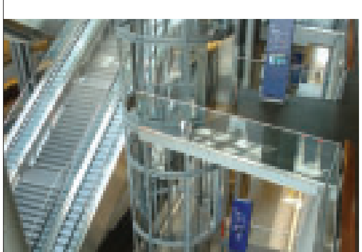

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### CANopen Specification for Lift Control Systems

CAN in lift control applications has been used for many years by major lift manufacturing companies. In 2002, several medium-sized companies decided to move to a standard higher-layer protocol based on CAN. Some decided to use CANopen as a basis for this standard. The goal was to have some kind of plug-and-play lift-control system for any standard lift application. The result of the standardization work is the CANopen application profile for lift control systems CiA DSP 417. By using this standard, it is possible to build a lift application with a maximum of 254 floors and eight parallel lifts.

### CANopen Basics

CANopen is a set of network protocol specifications based on CAN that is used in most modern passenger cars. The CAN controller chips are sold in high volume (some 300 million every year). However, CAN is just a data link layer protocol. In human communication, one would call this a character set. In order to communicate between human beings, one needs a language made up of grammar and vocabulary. In network technology, these are called application layer and application profile. The application layer defines the communication protocols to be used (comparable to grammar), and the application profile defines all of the parameters and signals. The CANopen protocols are specified in the EN 50325 European standard.

### The CANopen Lift Profile

CiA's CANopen Special Interest Group lift developed the DSP 417 specification which describes the communication in a multiple lift control system. The exhibiting companies at Interlift 2009 in Augsburg, Germany, showed prototypes of panels, drives, doors, controllers, etc. compliant to the CANopen lift standard. The CANopen lift specification is available for CiA members for free and may be implemented without license fees. The specification describes the default communication of a control system for up to eight lifts with up to 254 floors each. The

**Powerful Features**

1. *16 bit CRC Check*
2. *Acknowledge bit*
3. *Form Error Detection*
4. *Node Send / receive Error counter*
5. *Bit stuffing for proper synchronisation*
6. *Bus control for more Priority messages*
7. *NRZ encoding for max bandwidth*
8. *Differential signal on bus for noise immunity*
9. *Collision avoiding without data loss*
10. *Wiring Reduction*

*Figure 3*

default communication can be changed via configuration. The lift application profile defines so-called virtual devices. A physical device may implement several virtual devices. However, a virtual device cannot be distributed to different CANopen physical devices. The following virtual devices are specified:

- Drive controller
- Call controller
- Display controller
- Car-door controller
- Car drive unit
- Car position unit
- Car door unit
- Light barrier
- Car panel
- Car display
- Sensor unit
- Load-measuring unit
- Panel input unit
- Panel output unit

All of these virtual devices implement mandatory functions as well as optional behavior. For example, the car-door controller transmits the control word to the car-door unit, commanding the door to open or close. The door unit responds with its status word via the CANopen network to the control system. The car-door controller also receives the light-barrier status information via the network.

The virtual-device concept allows the introduction of user-transparent gateways. CANopen networks are limited to 127 devices in one network (currently available CAN transceivers may even restrict this figure to a lower number). Gateways may overcome this limitation. The gateway may implement up to 254 virtual devices on each side and represent them to the other interface. The use of gateways also solves the problem of busloads being too high.

The virtual-device definitions for the car drive unit (motion controller) and car position unit (encoder) follow the generic CANopen device profiles for motion controllers (CiA DSP 402) and encoders (CiA DS 406). However, in lift control applications, they use different object dictionary entries. This is because the application profile uses the same object dictionary in all physical devices. In addition, any process data object (PDO) communication is predefined by methods other than the generic device profiles. The lift application profile also predefines the PDO communication between the devices. No simple master/slave communication is specified.

For example, the car door controller and the car drive controller receive the car position unit information. The benefit of this application profile for lift system designers is that they do not have to deal with the communication details. Everything is predefined by the lift application profile. However, if a different behavior is required, system designers may configure the functionality to be changed. The specification is open to this kind of customer-specific behavior. Highly sophisticated tools, which implement the lift application profile details, are available for this purpose.

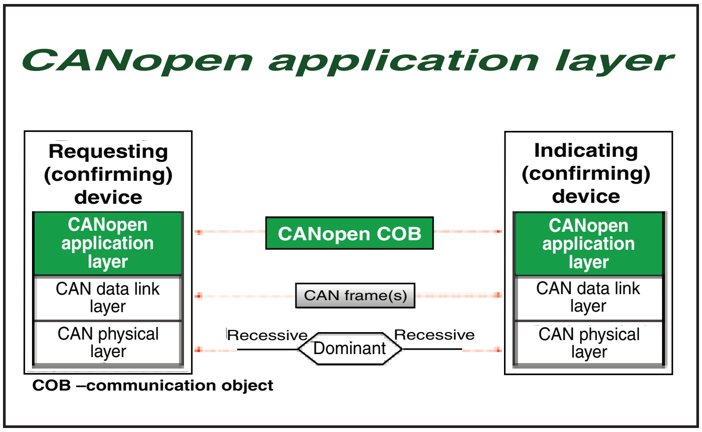


*Figure 4*

**Sudhir Abhyankar** is the manager of operations for Global Technology and a CiA India representative.

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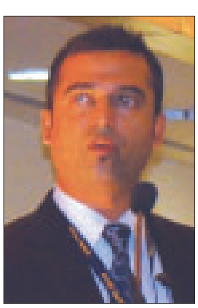
# The Elevator Management System: A Nonproprietary Approach

by Dinesh Musalekar

Presented at the

IEE EXPO 2010 CONFERENCE



**Dinesh Musalekar** is a director of TL Jones, India and heads its operations. He has 17 years of experience in the elevator industry and has worked in the sales, installation, modernization and engineering departments of major OEMs. He has a graduate engineering degree in Electronics and Communications and a postgraduate degree in Management.

## Background

With the increase in the complexity and magnitude of construction projects around the globe in the last decade, the need to have a central system in a building or group of buildings, not only to monitor, but also to control a few aspects of the elevators, has emerged as a distinct need. The elevator management system (EMS) thus becomes the critical and essential requirement of mega projects like large townships, large commercial complexes, information-technology parks, metros, airports, mixed projects involving entertainment hubs and malls that involve 20-200 elevators. All of the elevators and escalators in these premises can be connected to one central EMS.

## What Is the EMS?

EMS is comprised of three elements: monitoring, controlling and statistics.

### *Monitoring*

In an EMS, all elevators and escalators are graphically simulated, and their status is displayed on a single screen. This is a real-time status of the lifts and escalators. The elevators are displayed in different groups in the order of their physical presence. When the single screen is unable to accommodate all the groups/elevators, they are viewed by going to the next pages of the monitoring screen. While we graphically view a set (groups) of elevator information on the screen, the status of the remaining groups of elevators on the other pages are available on the same screen in a tabular form, as shown in Figure 1. This graphical status displays the elevator position, direction of travel and door status, such as opening, closing, car calls registered, hall calls registered and pending, etc.

The monitoring screen can be changed from the end-user-friendly

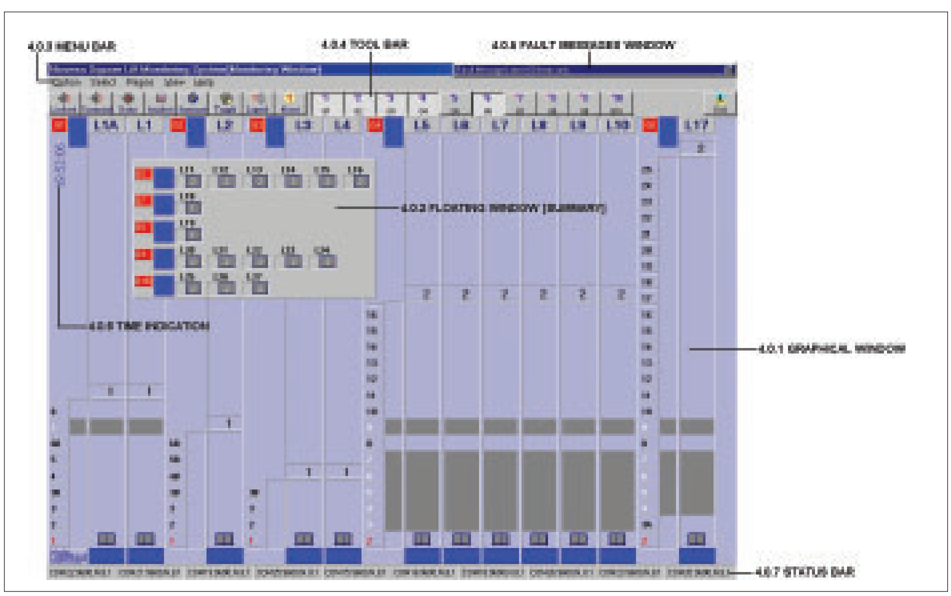


*Figure 1*

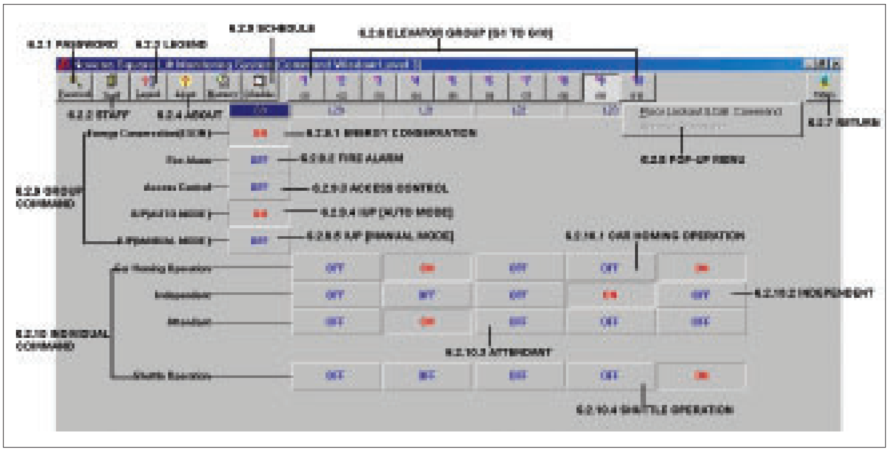


Figure 2


Figure 3

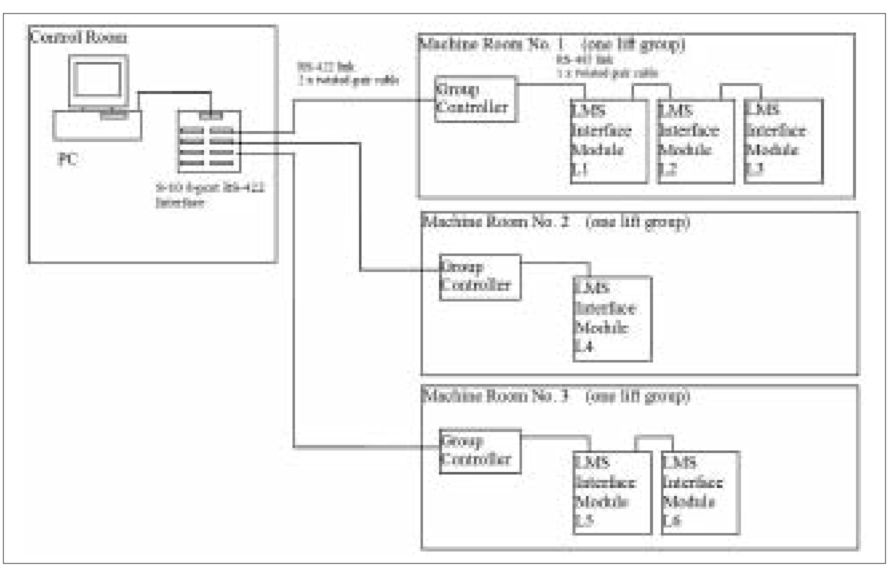



Figure 4

graphical monitoring screen to an elevator signal/operation monitoring screen. This is more useful for elevator mechanics to monitor the status of various input and output signals, and operational modes of all elevators of the entire project. He or she can sit at one central location and immediately identify faults (and even anticipate new faults before they occur) and stop the elevators.

***Controlling***

The controlling options involve giving operational commands to either individual elevators or groups of elevators. These commands can be given in either real-time or time-based commands. Individual elevator commands could be to put the elevator in "Attendant Mode" or "Independent Mode," or schedule a shutdown of the elevator.

Group commands could be integrated with other systems of the building and can be used to control them (e.g., to switch the access card system for the elevators on or off, or to integrate with the building fire-alarm system). One more important feature is to control the car-call buttons and/or hall-call buttons. One can block or release these individual car- and hall-call buttons of all the elevators with the click of the mouse. Of course, these controls are given to authorized building-maintenance personnel with unique passwords.

***Statistics***

Real-time historical data about all the elevators attached to the EMS are continuously recorded. The date and time between which the data to be analyzed can be entered in the fields "From" and "To," and the system can be run to obtain statistics such as the average wait time of landing or lobby calls (Figure 3).

This feature could be particularly useful for analyzing the sequence of events and various input/output statuses that have occurred before an elevator breakdown. This could help the elevator mechanic diagnose and fix the problem efficiently and effectively.

**System Architecture**

The system architecture of the EMS is as shown in Figure 4 and essentially involves the following elements.

*Continued*

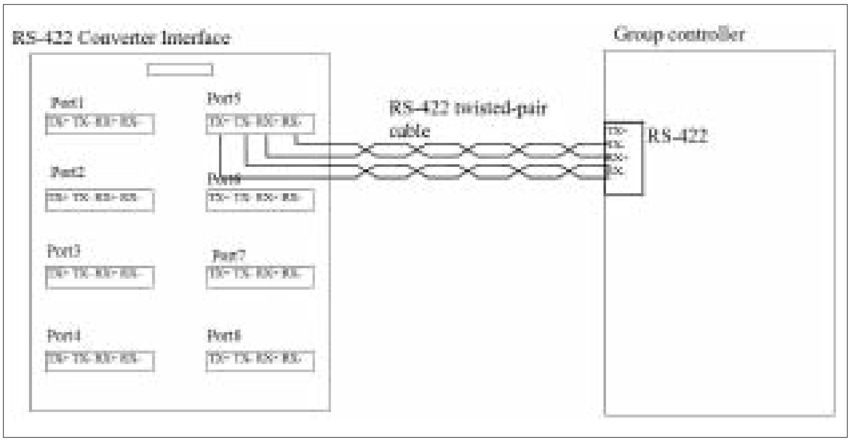



Figure 5

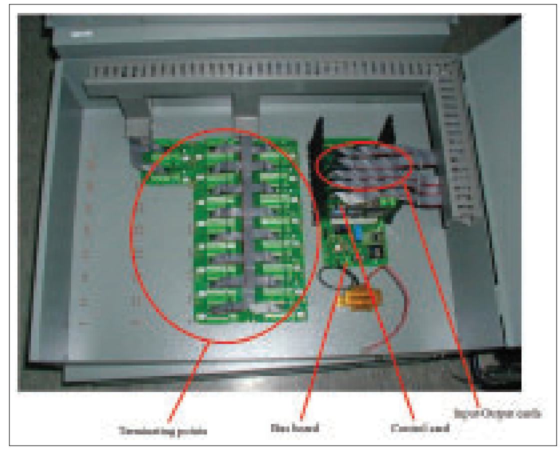


Figure 6

***PC and RS 422 Interface***

The PC loaded with the EMS software is located in the control room or the building management system room. This PC is connected to the RS 422 interface located in the control room via an RS 422 peripheral component interconnect (PCI) card within the PC. This, coupled with the RS 422 interface, provides the RS 422 port multiplexing interface to the group controllers located in each machine room/group of elevators. The RS 422 interface is available in different models, with eight, 16 or 32 ports. Depending upon the number of groups being connected to the EMS, the RS 422 interface model can be selected.

***Group Control Units***

Group control units are installed one per group, usually in the machine room or with one of the controllers of the group (in the case of machine-room-less elevators). The interface between the RS 422 converter interface and the group control units is as shown in Figure 5.

The communication between the group controller in each group and the RS 422 converter interface is via RS 422 twisted pairs. Each group gets connected to a specific port of RS 422. The TX +/- of the RS 422 converter port gets connected to the RX +/- of the group controller's RS 422 port and vice versa.

***Lift Interface Module***

The lift interface module is the most important part of the system. Here, the EMS is expected to read/tap the individual lift information. This can be done by reading the information from the serial link of the individual elevators (only possible if the elevator OEM shares its protocol with the suppliers of the elevator maintenance system) or by reading the various input and output (I/O) signals discretely though I/O ports.

Individual lifts' discrete input and output signals are terminated at the terminating points. The input cards can read the signals through the opto couplers, ensuring electrical isolation from the elevator signals to the EMS. The output card provides the signals to the elevator through the potential free contacts, again ensuring electrical isolation from the system to the elevators.

The EMS also contains the RS 485 controller card and bus board for communication with the group controller. Communication with the various lift interface modules connected to each individual elevators and the group controller takes place as using the RS 485 link.

***Input and Output Signal Termination***

The I/O signals are terminated at the lift interface module, maintaining the aforementioned electrical isolation. Input signals, like floor numbers, direction of travel, lift status, door status, registered car/hall calls, etc., can be monitored. The inputs from the building's other system, such as fire, access control, etc. can also be read and subsequently used to command elevator behaviors.

Similarly, the commands can be given from the EMS to the elevators through the output boards. These could include parking, attendant, independent or shutdown signals. The connection would typically look like what is shown in Figure 9.

**Current Scenario in India**

Very few elite projects in India have full-fledged EMSs being supplied and installed, as

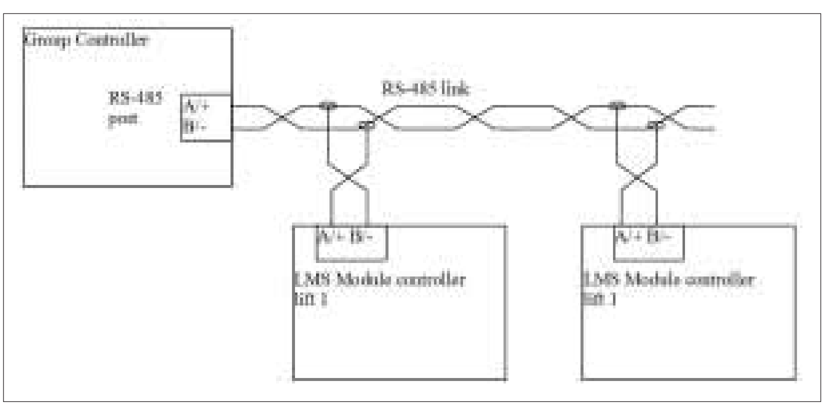



Figure 7

the major elevator OEMs connect units to their own specific systems. There are few other projects in which very limited lift information is displayed in the building management system by using only a few free contacts from the elevators. These setups only provide basic and limited monitoring. Many other projects in the country have no such arrangements.

**Why the Nonproprietary Approach?**

It's needless to say that EMSs are useful when a large number of elevators is involved. On many occasions, it takes lift mechanics in large complexes more time to locate the elevator to be attended to or passengers to be rescued than the actual time they take to fix it. Building owners have the following challenges:

- When they have more than one major elevator company supplying the elevators in the premise, which options do they have? Should they go with more than one EMS in the building?
- When they have other building services, like access cards or fire systems to work in conjunction with the EMS to give commands to the elevators, who does the applications engineering?
- When they have second-tier elevator manufacturers supplying elevators, who should they look to for providing an elevator management solution?

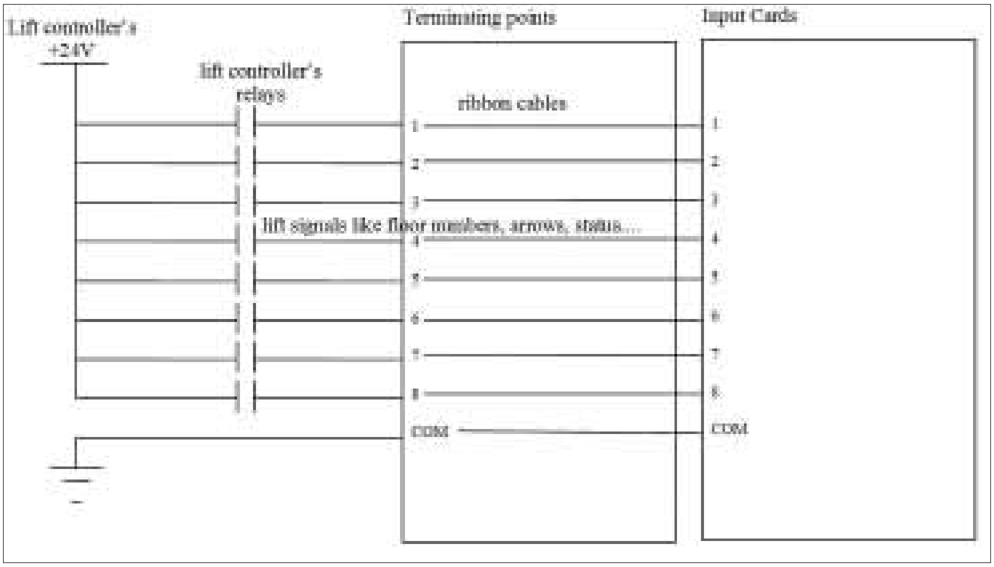



*Figure 8*

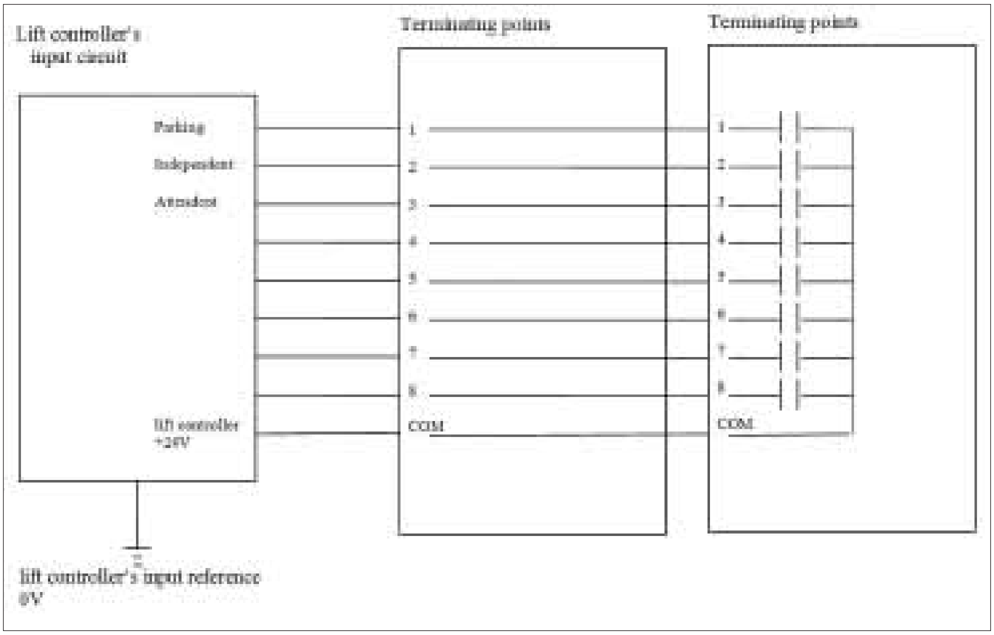



*Figure 9*

**Conclusion**

The system described here provides a complete solution to most of the current challenges. Third-party experts can provide applications engineering to various unit combinations and situations. Your author would like to urge the major OEMs to share their protocol on the project basis with the third-party experts to provide better solutions to end users, in turn helping the OEMs also better maintain their elevators.

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# Elevators for Improving Life Safety

by Samson Rajan Babu

Presented at the IEE EXPO 2010 CONFERENCE

**Samson Rajan Babu** is a vertical transportation engineer for Burt Hill in Dubai. He has more than 11 years of experience in project design, project management and project sales of elevators and escalators, including more than 10 years in the Gulf of Arabia region. His current responsibilities include expert services on project planning, vertical-transportation system design, project execution quality control for elevator and escalator systems and interfacing with other trades (life safety, mechanical, electrical, fire fighting, interiors, and BMS/IT systems). His areas of expertise includes destination controls, double-deck systems, super-high-rise buildings, evacuation elevators and evacuation communication systems. He is a member of the International Association of Elevator Engineers in the U.K. He received his Bachelor of Mechanical Engineering in May 1994 from the College of Engineering (Guindy), Anna University, Chennai, Tamil Nadu, India.

## Introduction

Every new high-rise project has a mandatory requirement of life safety assessment by the authority having jurisdiction. An architect has to ensure that the building has been designed to meet the life safety codes as mandated by the local civil defense authorities and municipalities. Though "fire emergency" has meant "life safety" for many years, post 9/11 incidents have resulted in the need for considering other sorts of emergencies. Hence, architects and planners have the responsibility of enhancing life safety features within projects by employing suitable equipment and technology.

The National Fire Protection Association (NFPA) series of life safety codes are followed for all types of occupancies in most parts of the world. For healthcare facilities, additional considerations are made using British Health Technical Memorandum (HTM) codes. The code requirements vary according to the type of occupancy of the planned building. "Life safety scheme approval" is an important phase in the design of a building, wherein, design experts analyze the risk elements and identify the ideal evacuation concept. It incorporates suitably sized means of egress, locating them within easy reach of occupants and considerations for the disabled, all according to the NFPA life safety codes. For specialized buildings (such as high rise, towers, healthcare, amusement parks), this process takes on more importance in that a number of revisions are required.

The architect (sometimes with the help of a specialist) prepares a set of life safety drawings and life safety reports for submission and approval by the local civil defense authorities. Various elements that help in evacuation in case of emergency are highlighted on these drawings. The authorities review the provisions and approve and/or demand more to grant an approval.

In approving any "life safety scheme," the authorities must look for the provision of firefighter elevators. Even though the minimum requirement is one fireman's elevator per building, authorities may demand more fireman's elevators, depending on the floor plate and access conditions.

## Evacuation Management

Any professionally managed building should have an in-house team of emergency responders for crisis management. This team should have an evacuation manager, evacuation coordinators, floor wardens and an evacuation plan for different levels of threats. They should also be familiar with the tools and equipment available for evacuation purposes, regularly test such equipment, maintain upkeep records of such equipment and conduct evacuation drills regularly to familiarize the occupants with the egress options available within the building.

Traditionally, occupants have been advised not to use elevators in case of fire. The NFPA codes recommend this in order to avoid occupants misusing them. However, the NFPA codes allow the elevators to be used

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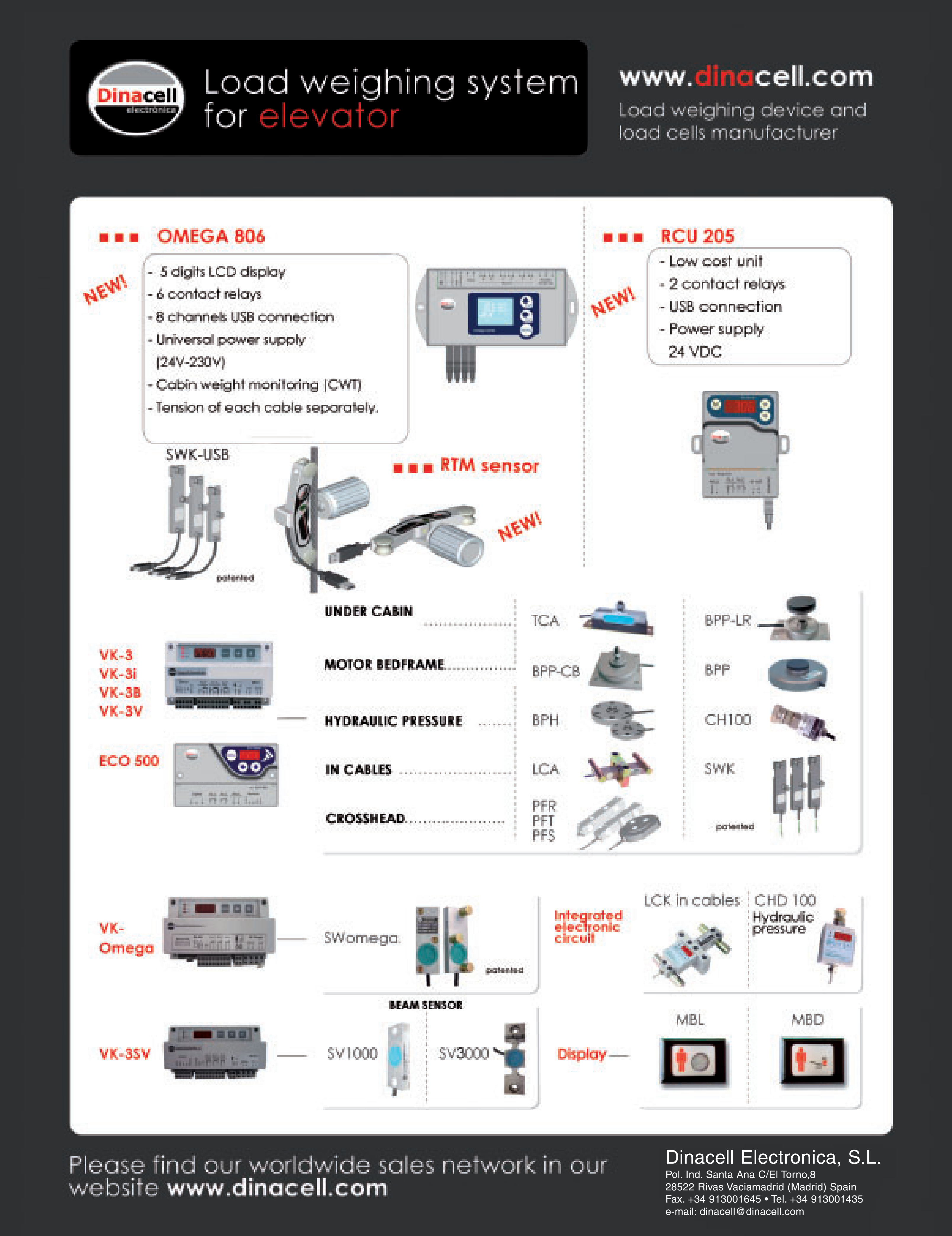
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as an "accessible means of egress" for people with disabilities and people having difficulty using stairs. The elevator-assisted evacuations are carried out by fire department personnel after acquiring elevator controls by Phase-2 Firefighter's Operation.

Is it feasible to use the elevators for evacuation by trained personnel within the building? More than feasible, the requirement for "occupant controlled evacuation" is understood to such an extent that the NFPA 5000 safety code now requires at least one first responders' elevator to be provided on high-rise buildings. (Clause 33.3.7)

**Occupant-Controlled Evacuation**

Occupant-controlled evacuation may be required in both fire and non-fire emergency situations. Once an emergency has been identified, it is critical not to delay response, but instead act. Trained emergency responders within the building should be able to carry out occupant-controlled evacuation in order to save lives. When a fire is located far away from the elevator or elevator lobby, the elevators will not move on to Phase-1 recall and will instead remain in normal operation. These elevators can be used to evacuate the occupants. This scenario is also similar to "non-fire evacuation."

Even when a fire is located closer to the elevator or elevator lobby, the working condition of the elevators can still be maintained in normal operation by means of "hardening" the elevator and its surroundings. "Hardening" means improvement of various elements such as:

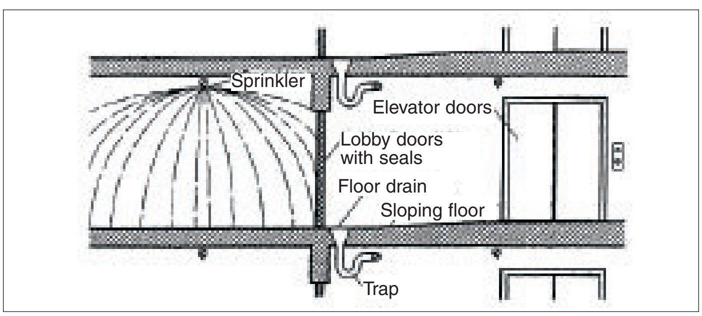



*Figure 1: Water protection features for elevator surroundings*

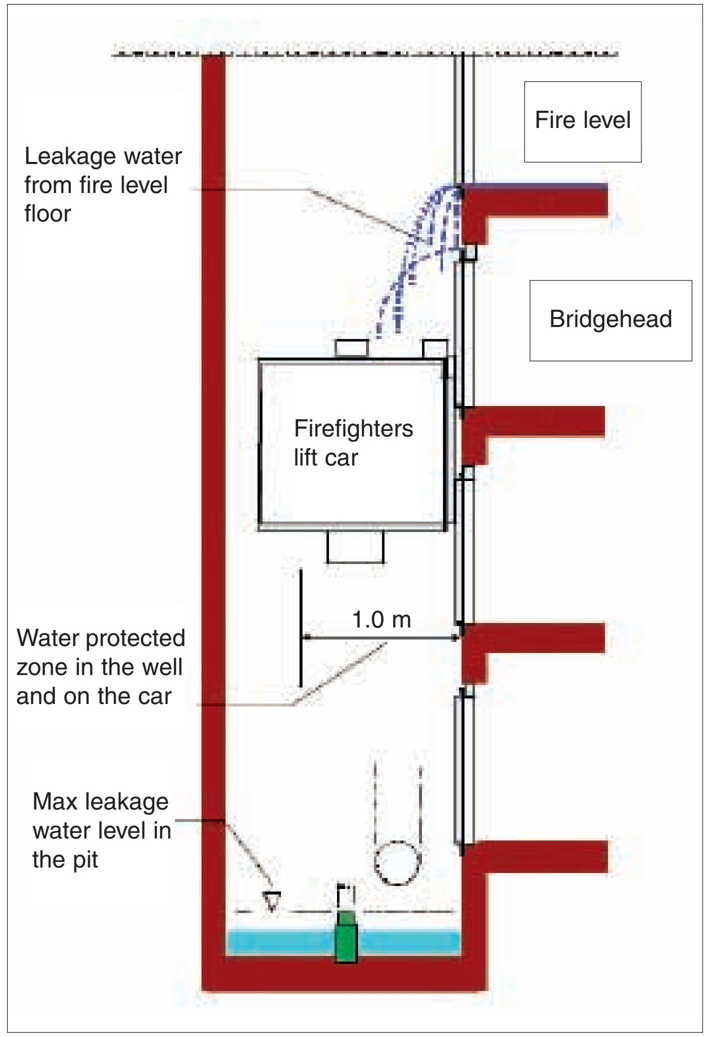




*Figure 2: Water protection elevator equipment inside hoistway*

1) Protected elevator lobbies and elevator machine rooms
2) Pre-action type sprinkler system inside elevator machine rooms
3) Fire rated elevator landing doors with flame guards
4) Water protection
5) Limit water level inside pit not more than level of compressed buffer
6) Deflecting water away from elevator entrance
7) Trench drains near the lobby door
8) Standby power to the elevator
9) Standby power to the machine room air conditioning.

**Note:** Many of the above items are covered in EN 81-72: Firefighter's lifts.

To facilitate occupant-controlled elevator evacuation, the requirement is to have real time information on the following:

a. Location and severity of fire – can be obtained from addressable fire alarm systems
b. Elevator operational status – can be obtained from monitoring system/supervisory panel (Figure 3)

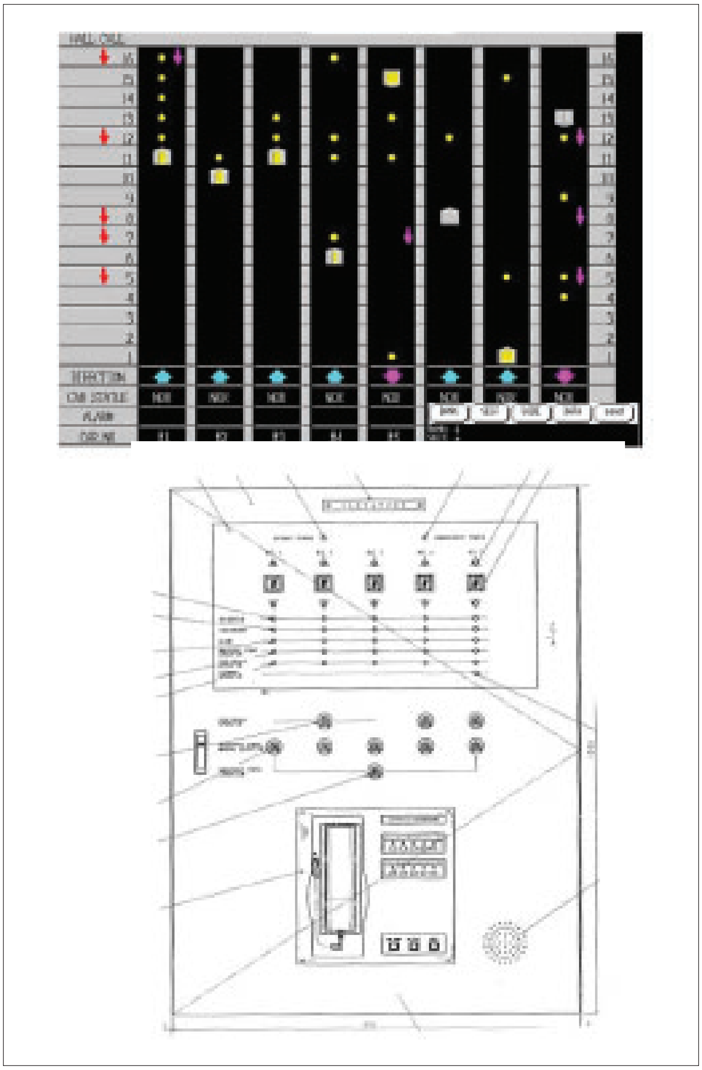


*Figure 3: Elevator monitoring system/supervisory panel*

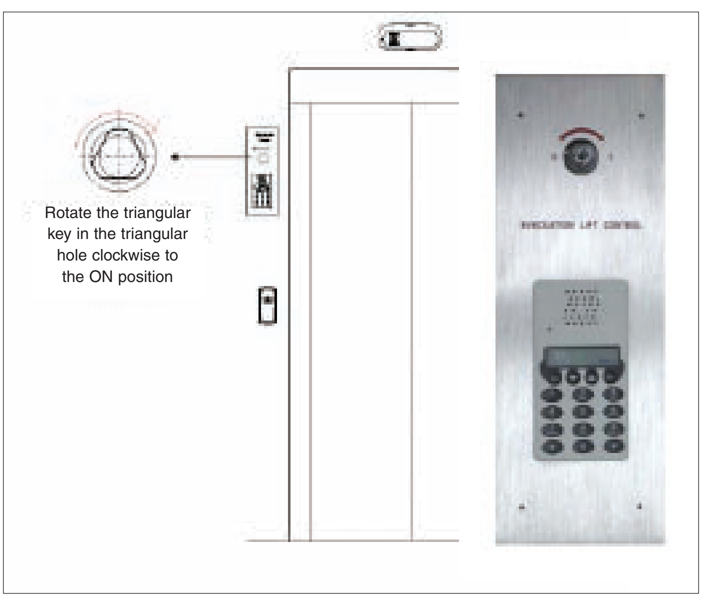



*Figure 4: Elevator evacuation control switch at the main exit floor (along with master station of elevator evacuation communication system) (Courtesy: Drucegrove, the U.K.)*

c. Elevator lobby and machine room condition – can be obtained through closed-circuit television cameras
d. Power supply status – can be obtained from building-management system (BMS) panel

With all of this information, the building management team and the emergency responders on each floor can decide the evacuation strategy (total evacuation or progressive evacuation or fractional evacuation).

**Evacuation Elevator Control Switch**

In order to gain exclusive control of the elevator for occupant-controlled evacuation, NFPA5000 -Annex E recommends manually activating the phase-1 recall. (Using phase-2 operation for occupant-controlled evacuation is to be understood, though not detailed, within Annex E.) Further guidance on occupant-controlled evacuation elevators can be taken from HTM05-03 Part-E "Escape lifts in healthcare premises." This code recommends an "evacuation control switch" located at the evacuation control point (i.e., the main exit floor) (Figures 4 and 5a).

**Evacuation Elevator Voice Communication System**

At this point, human behavior during an emergency evacuation should be considered. Unless reliable information is provided to occupants by authoritative persons, there will most likely be misconception, panic and rumors. The occupants will be uncertain of their status; whether to wait for an elevator, whether the elevators are in good working condition, etc. NFPA72 recommends a suitable means of communication (a public addressing system) for each floor as a part of the fire alarm system. This includes communication with elevator lobbies. It may be noted that this is only a one-way communication from the command center to selected floors and/or lobbies. An occupant cannot initiate a call to the command center.

Continued

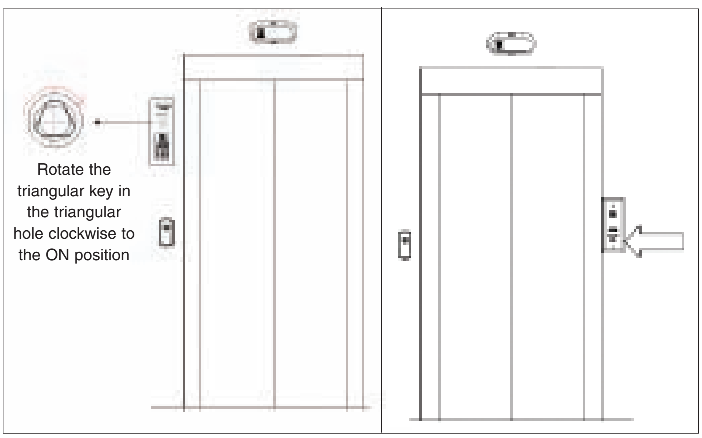
(a) (b) (c)

*Figure 5: (a) Master station at main exit floor; (b) Slave station (with call button) at upper floors; (c) Slave station (without call button) inside car (Courtesy: Drucegrove, the U.K.)*

HTM05-03 part-E recommends an independent two-way communication system, which facilitates communication between each elevator lobby, elevator car and the main exit floor. A typical "elevator evacuation communication system" is described as follows:

*"The system consists of one or more stations having master stations (with dialing pads) and the other stations (slave stations) which have push-to-call single buttons. A slave station inside a car usually does not have a push-to-call single button. All stations have built-in speaker grills and microphones to allow two-way communication between any two stations." (Figures 5a, 5b and 5c)*

*"Typically, a master station is provided at the main exit floor for an evacuation elevator. Slave stations are provided at each elevator landing and machine room. Slave stations (without push-to-call buttons) are provided within the car." (Figures 6a and 6b)*




*(a)* *(b)*

*Figure 6: (a) Elevator evacuation control switch at the main exit floor (along with master station of elevator evacuation communication system) (Courtesy: Drucegrove, the U.K.); (b) Slave station of elevator evacuation communication system at upper floors.*

*"The master stations have a display panel above the keypad that displays "caller identification" (programmable name-up to 13 characters) when receiving a call or the "station identification" when making a call. Alarm calls can be made using the intercom system from any landing to the master station(s). If more than one station makes an alarm call at the same time, their initiation will be memorized and queued. Information is displayed giving the number of alarm calls and their priority on a first-come/first-serve basis." (Figures 7 and 8)*

Note it is not possible to listen and talk at the same time (i.e., when pressing "talk" the speaker will not allow the incoming conversation to be heard).

When the alarm button is pressed and held for one second, the master stations will emit the alarm tone and display the name and number of the alarming station. The word "alarm" will also be displayed above the left key. When the left key is pressed, voice communication is made to the alarmed station and "alarm" is replaced by the word "talk" (Figure 7). By pressing the left key, the master station can immediately talk to the calling station. The person at the calling station needs to do nothing in order to hear the master station. The calling station will produce a beep tone every 20 seconds to indicate that a call is in progress and that the microphone is "open" or "live." If further alarm calls are made, they will be held in a queue.

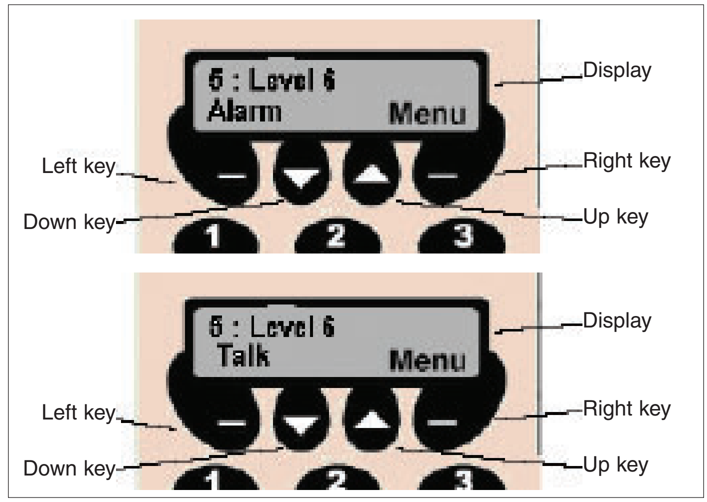



*Figure 7: Making/receiving calls between master station and slave stations (landing)*

To call the lift car, simply use the up and down keys to scroll through the list of programmed levels until the desired recipient is found and press the left call key. It will then be possible to talk to the lift operator in the lift car by pressing the left hand key for "talk" (Figure 8).

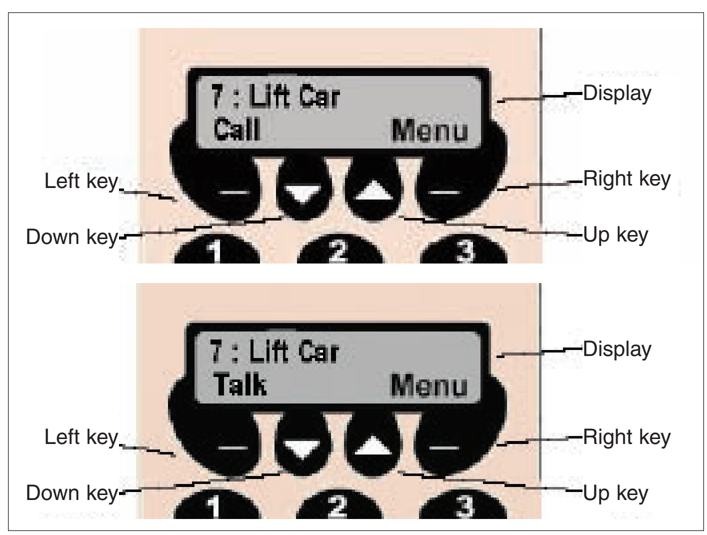



*Figure 8: Making/receiving calls between master station and slave stations (car)*

**Evacuation Elevator Status Indicators**

In order to improve the clarity of information sent to or from the intercom stations, suitable visual indicators have also been recommended by the above codes. These indicators convey the following information to occupants and evacuation staff:

- The elevator is available for evacuation use (at each landing)
- The elevator is not available for evacuation use (at each landing)
- The elevator landings at which occupants wait for evacuation (at main exit floor)

NFPA5000-Annex E recommends color-coded lights along with the above illuminated displays to confirm the status of the elevator at each elevator landing as follows:

***Message Displayed Color Code***

- "Elevators available for occupant evacuation" – Green light
- "Elevators out of service, use exit stairs" – Red light
- "Elevators are operating normally" – No light

**Conclusion**

Information on-hand is crucial in evacuation scenarios to decide for and to execute evacuations successfully. Through many years of technological development and analytical thinking focused on the "elevator assisted evacuation" subject, we now have available workable concepts, technology and equipment to collate real time information and to share it for the benefit of users. Though there is no mandatory requirement by the codes, so far, it is not an idle subject. All the code organizations are busy developing a regulation on this subject, which should soon become a mandatory requirement.

Architects and planners should start using such novel concepts more on their new projects voluntarily. "Elevator assisted egress" could help as a standby feature to the primary egress concept should any of the primary egress components become redundant. When incorporated, these features bring a great level of satisfaction to the designer of having increased the safety features of his project multifold. The authorities would appreciate the main egress and alternate egress features, which should speed the approval process. Only when put into practical usage, further clarity and refinement on this concept and equipment can be achieved.

**References**


1) Klote, J.H., Levin, B.M., and Groner, N.E. (1995), *Emergency Elevator Evacuation Systems, Proceedings of the 2nd Symposium on Elevators, Fire and Accessibility*, Baltimore, Maryland, April 1995.
2) *BS EN 81-72:2003 Safety Rules for the Construction and Installation of Lifts – Particular Applications for Passenger and Goods Passenger Lifts – Part 72: Firefighters Lifts*
3) *NFPA 5000 Building Construction and Safety Code – Annex E "Elevators For Occupant Controlled Evacuation Prior To Phase I Emergency Recall Operations"*
4) Big Voice Evacuation Intercom System by Drucegrove Ltd. – www.drucegrove.com
5) ELVIC monitoring & control system by Fujitec – www.fujitec.com



# Hyundai Elevator: A Quarter Century of Operations

Established in 1984, Hyundai Elevator has played a role in the recent growth of South Korea's elevator industry. The 25-year-old company developed its first machine-room-less elevator in 1999. Hyundai Elevator applied gearless-traction technology to medium- and low-speed in its Luxen elevators in 2006.

In July, the company announced plans to export high-speed elevators that move faster than 300 mpm. Ten elevators will be exported to Venezuela for installation at a government complex in the capital city of Caracas. The units include two with a speed of 480 mpm, four that move 420 mpm and two at 360 mpm.

The company's new 205-meter-tall test tower is equipped with five elevators, which includes one that travels at a top speed of 600 mpm and an observation elevator traveling at 420 mpm. Hyundai plans to install two more elevators traveling at 1,080 mpm. The tower, which began operations in April, is located at company headquarters in Icheon in Gyeonggi Province. In addition, a high-speed development team formed in September 2007 coordinates related R&D with Seoul National University.

In February 2008, CEO Song Jin-cheol told the Maeil Business Newspaper, "By securing independent technology in the high-speed elevator sector, Hyundai Elevator will intensify its reputation as the industry's leader."

Hyundai Group officials and other dignitaries officially opened the test tower on April 15 (ELEVATOR WORLD, June 2009). Attending the ceremonies were 300 guests, including Gyeonggi-do Governor Kim Moon-soo, Icheon City Mayor Joh Byung-don, Hyundai Group Chair Hyun Jeong-eun and Song Jin-chul. The test tower was named Hyundai Asan Tower in honor of Chung Ju-young, the founder of the Hyundai Group, who went by that pen name. A technology research center located at the base of the tower was named Chung Mong-hun Research and Development Center after a former chairman of the Hyundai Group. Hyundai Elevator began operating its new test tower in April.

Hyundai Elevator plans to test elevator comfort, vibration, noise, temperature and atmospheric pressure

*Continued*


Test tower

## Hyundai Elevator Increases Market Share

In July, Trading Markets reported that Hyundai Elevator Co. had increased its share of the South Korean elevator market. For the first six months of 2009, the South Korea-based company had sales more than twice those of the two foreign-based companies with the next largest shares. According to the South Korean Ministry of Knowledge Economy, Hyundai Elevator had a market share of 40% on sales of 4,990 units in the first half of the year. In the same period, U.S.-based Otis Elevator Co. had a 19.5% share of the South Korean elevator market, while Germany-based ThyssenKrupp Elevator had a 17.5% share.

Hyundai Elevator also reached a milestone in cumulative elevator sales earlier this year. In April, the company surpassed 100,000 units in sales over the course of its quarter-century history.

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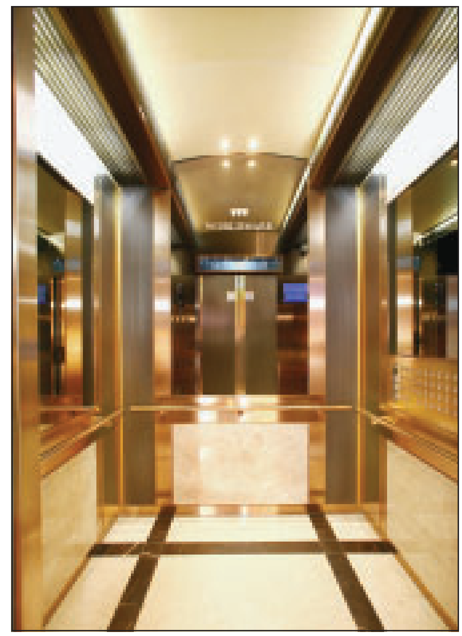
in the test tower to verify safety and reliability of the high-speed elevator system and its components. It will also be used to develop a double-decked elevator that allows operation of two elevators in one shaft.

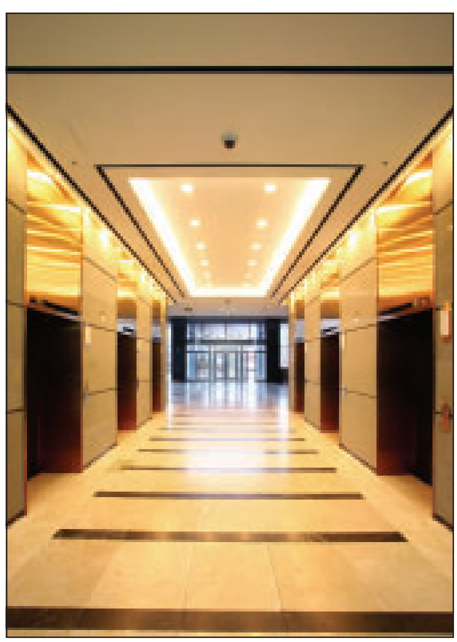
As part of its joint research with Seoul National University, Hyundai Elevator developed an elevator inverter that regenerates electricity while in operation. South Korea's Ministry of Science and Technology presented its New Excellent Technology certificate for this development. This inverter recycles the energy generated during elevator operation to reduce a building's energy consumption.

## Hyundai Elevator Installations

Haewoondai Hyperion



Haewonndai Woodong Condominium, Pusan, Korea



Haewoondai Hyperion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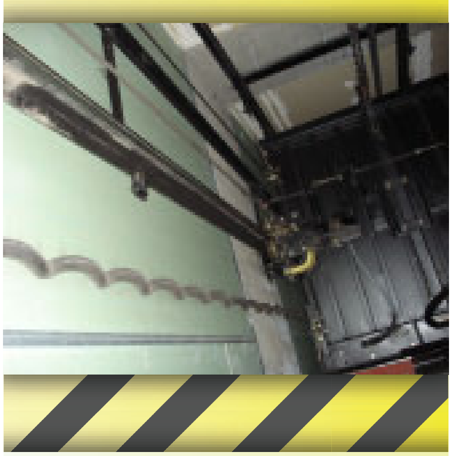

a.) Twisted traveling cable

b.) Toe guard too short

c.) No car top safety railing

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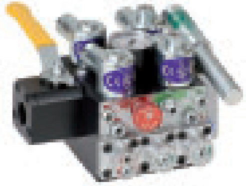

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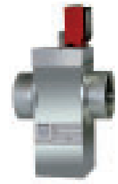
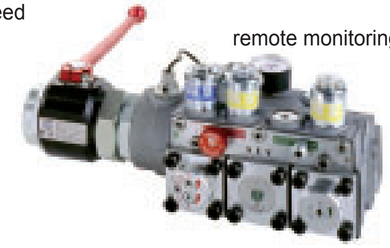


**SEV**

remote monitoring



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## LIFT BACKUP SYSTEM

Volta offers a lift power backup system. Manufactured by Makson Engineers, the system features automatic operation, high inrush/peak current handling capacity, pure sine wave output, a high-frequency pulse width modulation inverter, crystal-controlled output frequency, quiet operation, and is compact and environmentally friendly.

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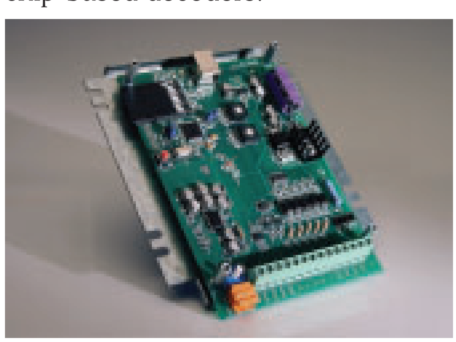
## ORATOR 3 ELEVATOR AUDIO SYSTEM

Formula Systems offers an elevator audio system designed to provide elevator manufacturers with an advanced, flexible and user-friendly system. The Orator 3 employs MP3-based audio compression, and its decoder is embedded in the software so that the unit does not rely on chip-based decoders.



Orator 3 offers memory for audio storage and enables fast file updating. It comes with a predefined library of common phrases, numbers and announcements, and provides user control over audio contents, including multiple language options, voices, sounds, alarms and music. The product is offered in serial or parallel models, neither of which require special tools to install.

For more information, contact Formula Systems at Technology House, Oakfield Estate, Eynsham, Oxford, OX29 4AQ, U.K.; phone: (44)1865-882442; fax: (44)1865-881647; or website: www.formula-systems.com.

## NEW SYSTEM FOR TESTING WIRE-ROPE TENSION

Dinacell Electrónica recently launched its new system for testing wire-rope tension. The RTM sensor, in conjunction with the new controller Omega 806, can measure the cabin weight, counterweight and tension of each rope. The sensor is equipped with a LED light indicator that marks the exact point on fitting to the rope. It can be installed without additional accessories and plugged into the controller by USB connectors. The RTM sensor covers a cable diameter range of 5 to 22 mm and is pre-calibrated in the factory.

The Omega 806 uses standard functions that limit and control the load in elevators. The imbalance level between the ropes can be detected by an alarm relay. It is capable of using up to six contract relays in each control unit. The information is displayed in a five-digit LCD screen with eight bars that show the deviation of each rope. The connections also include an output for cabin display and eight USB inputs for sensors.

For more information, contact Dinacell Electrónica at phone: (34) 91-3001435, fax: (34) 91-3001645, e-mail: dinacell @dinacell.com or website: www.dina cell.com.

### REGENERATIVE AC SOLUTIONS

Magnetek, Inc. now offers regenerative AC drive solutions, the Regen AC Module and Enclosed Regen AC Module. The Regen AC Module, when connected to an existing elevator drive, transfers excess regenerative energy from the motor to the incoming AC power source. Heat that is otherwise dissipated into the machine room is transferred as energy back to the power line. Existing dynamic braking resistors can be maintained for failsafe operation. The module is programmed to operate prior to a Brake Chopper circuit. The Enclosed Regen AC Module is a fully enclosed unit that is preassembled in a wall-mount cabinet. These new units increase energy efficiency and can be appropriate for both elevator modernizations, and new installations.

For more information, contact Magnetek at N49 W13650 Campbell Drive, Menomonee Falls, Wisconsin 53051; toll free: (800) 288-8178; fax: (800) 298-3503; e-mail: magnetek info@magnetek.com; or website: www.magnetek.com.

### ESCALATOR SAFETY BRUSH

Tarini Engineering Pvt. Ltd. introduced its new escalator skirt brush in April. The brush holder material is made of aluminum alloy grade 6063-O, and the brush holder finish is available in anodized silver or black matte. The maximum length of each piece is 3 m, and the product features low-friction, aluminum block end caps secured by screws. The brushes are flagged in order to provide a softer contact surface for riders; they are also pitched downward to discourage the retention of liquids and other contaminants along the brush surface. The leading edge of the brushes is chamfered in order to create a 90° orientation to the step surface. The product is durable, weather resistant and rust resistant and comes in flexible designs that allow transitionary curves to be formed onsite.

For more information, contact Tarini at 17-B Waghela Bhuvan, J.P. Road No. 1, Goregaon (East), Mumbai 400 063; phone: (022) 64526397; fax: (91) 022-26855027; e-mail: tarinienginee ring@rediffmail.com; or website: www. tarini engineering.net.

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**Contact:** Zhang Lexiang
**President:** Ren Tianxiao
**Products Manufactured/Supplied:** CEA was formed in 1984 and has 500 members. The secretariat together with the Institute of Building Mechanization. CEA is one of the sponsors of China World Elevator & Escalator Expo and China Elevator Magazine.

## DSA ELECTRO CONTROLS PVT. LTD.

A-20, CROSS ROAD-B, MIDC
ANDHERI (EAST), MUMBAI 400 093
MAHARASHTRA, INDIA
**Telephone:** 91 22 6742 9700
**Fax Number:** 91 22 6742 9714
**E-Mail:** marketing@dsaquality.com
**Web Site:** www.dsaquality.com
**Contact:** Mr. Ashok Subhedar
**Products Manufactured/Supplied:** Elevator Controllers and allied products, Fabrication Services - CNC Fabrication, Water Jet Cutting Systems & Services.

## DÍNACELL ELECTRÓNICA, S.L.

POLÍGONO INDUSTRÍAL "SANTA ANA"
C/EL TORNO, 8
28522 RÍVASÍVACÍAMADRÍD (MADRÍD)
SPAÍN
**Telephone:** +35 91-300-14-35
**Fax Number:** +35 91-300-16-45
**Website:** www.dinacell.com
**E-mail:** dinacell@dinacell.com
**Marketing Contact:** Frederick Apostoles Conde
**Engineering Contact:** Enrique Garcia Rodriguez
**Products Manufactured:**
Load Weighing Device for Elevators, Cab sensor, Cable sensor, Crosshead sensor, Hydraulic sensor, Motor bedframe sensor, Controllers, Display

## ELECON ENGG. CO. LTD.

POST BOX #6, ANAND
SOJITRA ROAD, VALLABH VIDYANAGAR
388 120, GUJARAT
**Telephone:** 0091 2692 236469, 236513
**Fax Number:** +91 2692 236527, 236457
**E-Mail:** VGSUBNIS@gear.elecon.com
**Web Site:** www.elecon.com
**Contact:** Mr. V.G. Subnis
**Products Manufactured/Supplied:** Manufacturer of Material Handling Equipment & all types of industrial gears - Helical, Worm, Couplings, Special Gears, Elevator Traction Machines, Wind Mill Gearbox and Wind Mill.

## ELEVATOR INDIA.COM

B/602,SHIVAM APARTMENT
C.H.S. LTD, C.S. ROAD NO: 5,
ANAND NAGAR, DAHISAR (EAST),
MUMBAI-400068
MUMBAI, MAHARASHTRA 400068 INDIA
**Telephone:** 022-40149991, 09930308303, 09322337066
**Fax Number:** 022-28974573
**E-Mail:** elevatorindia@yahoo.co.in; elevatorindia@gmail.com
**Web Site:** www.elevatorindia.com
**Marketing Contact:** same as above
**Sales Office:** same as above
**Products Manufactured/Supplied:** An elevator portal for end users and buyers. For elevator company we design, supply material, erect and give maintenance of traction and hydraulic lifts. Consultant and co-ordinator to elevator industry in India.

## ELMO SRL

V.LE CERTOSA 8/B
PAVIA ITALY 27100 ITALY
**Telephone:** +39 0382 529564
**Fax Number:** +39 0382 527041
**E-Mail:** info@elmoitaly.com
**Web Site:** www.elmoitaly.com
**Marketing Contact:** Mr. Giovanni Crucitti
**Engineering Contact:** Mr. Ivo Busi
**Products Manufactured/Supplied:** Submersible motors for hydraulic lift

## ETA MELCO ENGG. CO. PVT. LTD.

CHENNAI CITI CENTRE,
4TH FLOOR, No. 10&11, DR. RADHAKRISHNAN SALAI, MYLAPORE
CHENNAI - 600 004
**Telephone:** 044-2847 7370/71/72/73/75
**Fax Number:** 044-2847 7374
**Web Site:** www.etamelco.in
**Contact:** Mr. H.N. Sadaqathullah, Director
**Products Manufactured/Supplied:**
Mitsubishi Elevators & Escalators

## ELEVATOR WORLD, INC.

P.O. BOX 6507
MOBILE, AL 36660 USA
**Telephone:** (251) 479-4514
**Fax Number:** (251) 479-7043
**E-Mail:** sales@elevator-world.com
**Web Site:** www.elevator-world.com
**Marketing Contact:** Brad O'Guynn
**Sales Office(s):** Mobile, Alabama USA; Bangalore, India
**Products Manufactured/Supplied:** ELEVATOR WORLD magazine, ELEVATOR WORLD India magazine (www.elevatorworldindia.com, Elevator World Source© Directory, Elevator World Euro Source Directory and educational materials (www.elevatorbooks.com)

## EXPERT EQUIPMENTS PVT. LTD.

6, PUNJANI INDUSTRIAL COMPLEX, KHOPAT
THANE (WEST) - 400 601
**Telephone:** 022 - 25474884 / 25474885 / 25475153.
**Fax Number:** 022 - 25474884 / 25474885 / 25475153
**E-Mail:** expertequip@rediffmail.com
**Web Site:** www.expertequipments.com
**Marketing Contact:** Mr. Arvind T. Menon, Tel. No. 09323145570
**Engineering Contact:** Mr. T.R.C. Menon, Managing Director, Tel: No. 09323000028
**Products Manufactured/Supplied:** Own manufacturing of Expert "LEVITATOR"

## FORMULA SYSTEMS LTD.

TECHNOLOGY HOUSE,
OAKFIELD ESTATE
EYNSHAM, OXFORDSHIRE, 0X29 4AQ
UNITED KINGDOM
**Telephone:** 44 (0) 1865-882442
**Fax Number:** 44 (0) 1865-881647
**E-Mail:** sales@formula-systems.com
**Web Site:** www.formula-systems.com
**Marketing Contact:** John Curzon
**Engineering Contact:** Peter Collins
**Sales Offices:** Please refer to the Formula Systems website for up-to-date sales office listings.
**Products Manufactured/Supplied:** Infrared light curtains for new and modernization applications including the unique SafeZone 3D. True, digitised speech annunciators.

## FUJI ELECTRIC INDIA PRIVATE LTD.

409-410, MEADOWS, SAHAR PLAZA
ANDHERI-KURLA RD.
J.B. NAGAR, ANDHERI (E)
MUMBAI – 400 059
**Telephone:** +91 22 4010 4870 / 2820 6383
**Fax Number:** +91 22 4010 4872
**E-Mail:** info@fein.fujielectric.com
**Web Site:** www.fujielectric.co.in
**Products Manufactured/Supplied:** Elevator Drives

## GARAVENTA LIFT

7505 134A STREET
SURREY BC V3W 7B3
CANADA
**Telephone:** 604 594 0422
**Toll Free Phone:** 1 800 663 6556
**Fax Number:** 604 594 9915
**E-Mail:** jlepa@garaventa.ca
**Web Site:** www.garaventa.ca
**Contact:** Jake Lepa, Ext. 203
**Products Manufactured/Supplied:** Platform lifts (incline and vertical) for wheelchair users and people with walking difficulties, residential and LULA (limited use, limited application) elevators, portable stair-lifts, evacuation chairs.
**Company Statement:** Garaventa is committed to providing the best accessibility solutions for the application. We create an accessible world.

## GEFRAN INDIA PVT. LTD.

SURVEY NO.: 129/1,
NANDAN PARK – PLOT NO.: 6
CHAKANKAR MALA –
BANER-BALEWADI ROAD
BANER - PUNE 411045, MH, INDIA
**Telephone:** +91 20 66400400
**Fax Number:** +91 20 66400401
**Web Site:** www.gefran.com

## GMV S.P.A.

VIA DON GNOCCHI, 10
20016 PERO MILANO, ITALY
**Telephone:** (39) 02-33930-1
**Fax Number:** (39) 02-3390379
**E-mail:** info@gmv.it
**Web Site:** www.gmv.it
**Marketing Contact:** Mr. Berruto
**Engineering Contact:** Mr. Fossati
**Sales Offices:** Fax: Brazil ++55 413 3457855/ Canada ++1 519 6245675/ China ++86 10 68578709/ Czech Republic ++420 5 49211593/ France ++33 450 640211/ Germany ++49 89 9036191/ Greece ++30 210 2792914/ India ++91 22 23080025/ Poland ++48 22 8589969/ Portugal ++351 21 4453069/Spain ++34 902 345432/ Sweden ++46 472 45699
**Products Manufactured/Supplied:** Components for hydraulic elevators: single stage jacks, telescopic jacks 2-3-4 stages, hydraulically and mechanically synchronized; hydraulic power units: balanced valves and electronic valves, electronic system, heat exchangers; side-acting car frames; pawl device; cars; car doors; landing doors; operators; passenger lifts; freight lifts; freight lift components

## HAFELE
4TH FLOOR, JMC HOUSE,
BISLERI COMPOUND,
WESTERN EXPRESS HIGHWAY, ANDHERI (E),
MUMBAI - 400 099
**Telephone:** 0091 22 66950920,
0091 9322266912
**Fax Number:** +91 22 6695 09220
**E-Mail:** info@hafeleindia.com
**Web Site:** www.hafele.com
**Contact:** Mr. Ashish Kapoor,
Business Head - Hospitality Division
**Products Manufactured/Supplied:**
Dialock Elevator Terminals.

## HIMENVIRO ELEVATORS & ESCALATORS
202, SAGAR COMPLEX, NEW RAJADHANI
ENCLAVE, VIKAS MARG
DELHI - 110 092
**Telephone:** 0091 11 22549142
**Fax Number:** +91 11 2254 9130
**E-Mail:** sales@himenviro.com
**Web Site:** www.himenviroelevator.com
**Contact:** Mr. S.B. Khandelwal
**Products Manufactured/Supplied:** Elevator & Escalators & Component - COP, LOP, Push Buttons, COP Display Units

## HITACHI LIFT INDIA PVT. LTD.
UNIT NO. 307, 3RD FLOOR
ABW ELEGANCE TOWER
JASOLA DISTRICT CENTRE
NEW DELHI – 110 025, INDIA
**Telephone:** (91 11) 4060 5290
**Fax Number:** (91 11) 4060 5299
**E-Mail:** sales@hli.hitachi.co.in
**Web Site:** www.hitachi-lift.co.in

## HYDRO-PNEUMATIC TECKNIKS
K-17/A, ROAD NO. 6,
UDYOGNAGAR, UDHNA, SURAT
GUJARAT - 395 210
**Telephone:** +91 261 2277306
**Fax Number:** +91 261 2277306
**E-Mail:** hydropneumatic@hotmail.com,
hydropneumatic@dataone.in
**Web Site:** www.hydrosurat.com
**Products:** Manufacturers of Hydraulic Cylinders (Jacks) and Hydraulic Power Packs for Elevators.

## IGV S.P.A
VIA DI VITTORIO, 21
20060 VIGNATE, MILANO, ITALY
**Telephone:** (39) 02-951271
**Fax Number:** (39) 02-9560423
**E-Mail:** igvmail@igvlift.com
**Web Site:** www.igvlift.com / www.domuslift.com
**Marketing Contact:** Matteo Volpe
**Engineering Contact:** Carlo Belletti
**Sales Offices:** Luigi Martino
**Products Manufactured/Supplied:** Buffers, Controllers, Door Operators, Entrances & Fire Resistant Entrances, Elevator Systems, Gearless Elevator Systems, Geared Elevator Systems, Hydraulic Elevator Systems, Hydraulic Components, Handicap & Platform Lifts (DomusLift®), Lifts with reduced pit and headroom (SuperDomus®), Machine Room-less Lifts (Gearless, Traction & Hydraulic), Rescue Devices, VVVF Drives, Stairlifts (DomusStair®), Low Rise Platforms (DomusPlat®), Automatic doors for residential and commercial buildings (DomusDoor®), Goods Only Lifts (Cargofit®).

## INNOVATION INDUSTRIES, INCORPORATED
3500 EAST MAIN STREET (72802)
P.O. BOX 2996
RUSSELLVILLE, ARKANSAS 72811
**Telephone:** (479) 968-2232
**Toll Free Phone:** 1-800-843-1004
**Fax Number:** (479) 968-7986
**E-Mail:** iii@innovationind.com
**Web Site:** www.innovationind.com
**Marketing Contact:** Amber Dilday,
Paul Horney & Tom Thompson
**Engineering Contact:** David DeFrancisco
& Dennis King
**Sales Offices:** Ray Buford
**Products Manufactured/Supplied:** Car Operator Panels, Hall Stations, Position Indicators, Hall Lanterns, Serial Communication, Key Switches.

## JELTRON SYSTEMS (I) PVT. LTD.
PB NO. 49, 6-3-1199/2,
VAMAN NAIK LANE,
UMANAGAR COLONY, BEGUMPET
HYDERABAD - 500 016, INDIA
**Telephone:** 0091 40 23401159
**Fax Number:** +91 40 2340 1149
**E-Mail:** info@jeltron.com
**Web Site:** www.jeltron.com
**Contact:** Mr. Rajesh H. Kamatam
**Products Manufactured/Supplied:** Toshiba AC VF Drivers, Toshiba PLC, Toshiba Soft Starters, ARD, SCR Power Controller

## JOHNSON LIFTS PVT. LTD.
NO. 1, EAST MAIN ROAD,
ANNA NAGAR, WESTERN EXTENSION
CHENNAI - 600 101
**Telephone:** 044 26152200
**Fax Number:**+91 44 2615 1614
**E-Mail:** vj@johnsonliftsltd.com
**Web Site:** www.johnsonliftsltd.com
**Contact:** Mr. V. Jagannathan, Executive Director
**Products Manufactured/Supplied:**
Manufacturers of Elevators of various capacity - Passenger Lifts, Good Lifts, Passenger cum Bed Lifts, Gearless Type & Escalators.

## KAMAL ENTERPRISE
C-1/A-3, G.I.D.C. ODHAV
AHMEDABAD - 382415, INDIA
**Telephone:** +91 79 2287 0800
**Fax Number:** +91 79 2287 2273
**E-Mail:** info@kamalelevatorgear.com
**Web Site:** www.kamalelevatorgear.com
**Contact:** Manoj Panchal
Cell Phone: +91 99250 76725
**Products Manufactured/Supplied:** Design, Manufacture & Supply of all types Elevator Traction Machines

## KINETEK
STREET NO.1 ANMOL NAGAR,
NEAR KISAN COLD STORE
HOSHIARPUR, PUNJAB
146001 INDIA
**Telephone:** +91 93562.9437
**Fax Number:** +91 98152.94375
**E-Mail:** nasvinder.singh@kinetekinc.com
**Web Site:** www.kinetekinc.com
**Marketing Contact:** Nashvinder Singh
**Engineering Contact:** Nashvinder Singh
**Sales Office(s):** Punjab, India
**Products Manufactured/Supplied:** traction and hydraulic elevator controls, complete elevator and escalator packages, VVVF or direct line escalator controls, monitoring and dispatching systems, microprossor boards, automatic rescue devices, and peripherals.

## KONDAIA ENGG. CO. PVT. LTD.
POLLACHI ROAD, COIMBATORE - 641032, TN
**Telephone:** 0091 422 2611966, 0091 9965518845
**Fax Number:** +91 422 2611966 (Tele-Fax)
**E-Mail:** kondaiahari@gmail.com
**Web Site:** www.indiamart.com/kondaia/
**Contact:** Mr. S. Balaji
**Products Manufactured/Supplied:**
Manufacturers of Elevator Guide Rails, Machines and Cabins.

## KRISHNA ENTERPRISES
16, BRIJWASI
INDUSTRIAL ESTATE, SONAWALA ROAD, OPP.
UDYOG BHAVAN, GOREGAON (EAST)
MUMBAI - 400 063
**Telephone:** +91 22 2686 0470 (Tele-Fax)
**Fax Number:** +91 22 2686 1962 (Tele-Fax)
**E-Mail:** info@krishnaentps.com
**Web Site:** www.krishnaentps.com
**Contact:** Mr. Brijesh C. Bhindora
**Products Manufactured/Supplied:** Push Buttons, Car Operating Panels & Floor Operating Panels Glass COP & HOP, 'K' Type & other type Door Operator & Door Set (MS & SS), 'O' type Door Operator & Door Set (MS&SS), LCD Display for Elevator, RFID Smart Elevator Operating Panel, Door Safety Sensor (TELCO), Fan Grills and all other spares and accessories.

## LARSEN & TOUBRO
**Control & Automation Division**
A-600, TTC INDUSTRIAL AREA,
SHIL-MAHAPE ROAD
NAVI MUMBAI, MAHARASHTRA, 400710 INDIA
**Telephone:** 022-67226200
**Toll-Free:** 1800-233-5858 and 1800-200-5858
**Fax Number:** 022-27783032
**E-Mail:** cpcmtech@LNTEBG.com
**Web Site:** www.larsentoubro.com
**Marketing Contact:** Mr. Sanjeev Madhavan
madhavans@LNTEBG.com Ext:455
**Engineering Contact:** Mr. Pankaj Shah
shahpankaj@LNTEBG.com Ext:471
**Sales Office(s):** Mumbai (Tel: 022-67051191 Fax: 022-67051463); New Delhi (Tel: 011-41419523 Fax: 011-41419600); Chennai (Tel: 044-28462050 Fax: 044-28462102); Kolkatta (Tel: 033-22828418 Fax: 033-22827587); Baroda (Tel: 0265-6613618 Fax: 0265-2336184); Pune (Tel: 020-56033409 Fax: 020-26124910); Bangalore (Tel: 080-25020342 Fax: 080-25583613); Hyderabad (Tel: 040-66720319 Fax: 040-23242356)
**Products Manufactured/Supplied:** AC/ DC Drives, Soft Starters, Servo Motion Control Products, PLCs and HMI, Engineered Panels

## LERCH BATES PVT. LTD.
2, AJANTA, 11TH FLOOR,
75, COLABA ROAD
MUMBAI - 400 005
**Telephone:** 0091 22 22153740
**Fax Number:** +91 22 2215 3726
**E-Mail:** pervin.dasgupta@in.lerchbates.com
**Web Site:** www.lerchbates.com
**Contact:** Ms. Pravin Das Gupta
**Products Manufactured/Supplied:** Global Elevator Consulting Firm - New Construction Design, Modernisation Evaluations, Maintenance Audits & Condition Assessments, Client Oriented Maintenance Contracts.

## LIFT SYSTEMS INDIA PVT. LTD.
1311, NAVJIVAN
COMMERCIAL BUILDING,
LAMINGTON ROAD
MUMBAI - 400 008

**Telephone:** 0091 22 23073073
**Fax Number:** +91 22 2308 0025
**E-Mail:** sales@liftsystems.co.in
**Web Site:** www.liftsystems.co.in
**Contact:** Mr. S.M. Hajela
**Products Manufactured/Supplied:** Hydraulics Components for Lift - Power Unit, Piston, Car Frame & Accessories for all types of lifts, Cabin Door Drive, Landing Door Mechanism, Door Panels & Frames required for Automatic Doors for Lifts.

## LM LIFTMATERIAL GMBH

GEWERBESTR. 1, LANDSHAM
D-85652 PLIENING
(NEAR MUNICH), GERMANY
**Telephone:** (49) 89-9099790
**Fax Number:** (49) 89-9043143
**E-Mail:** info@lm-liftmaterial.de
**Web Site:** www.lm-liftmaterial.de
**Marketing Contact:** Mr. Stephen Kretzschmar
**Engineering Contact:** Franz Watzke - Ext. 90997920
**Sales Offices:** LM LIFTMATERIAL GmbH, Gewerbestr. 1, Landsham, D-85652 Pliening - GERMANY, Sales Director, Mr. Stephan Kretzchmar.
**Products Manufactured/Supplied:** Machineroomless rope traction lifts with drive in the shaft head and in the shaft pit, rope traction lifts for drive locations on top, down at the side, and on top at the side of the shaft, rope traction lifts with integrated machine room, modular hydraulic lifts with cantilevered car sling, hydraulic lifts with cylinder under or beside the cabin, twin piston or pulling piston drive system, panoramic lifts, hospital lifts, special execution lifts, drive system for rope traction and hydraulic lifts, automatic doors, manual doors and folding doors, cabins for passenger lifts, panoramic lifts and goods-lifts, car frames, safety gears, overspeed governors and buffers, ropes, rope pulleys and accessories, guide rails, controllers and speed regulations, photocells, safe screens, push button units and electro-magnetic cams, sundries.

## MAGIL CORPORATION

500 OAKWOOD ROAD
LAKE ZURICH, IL 60047 USA
**Telephone:** (847) 550-0530
**Fax Number:** (847) 550-0528
**E-Mail:** machines@magilcorp.com
**Web Site:** www.magilcorp.com
**Marketing Contact:** Joe Salzburg Ext: 115
**Engineering Contact:** Pete Giannis Ext: 108
**Sales Office(s):** Gilbert Voisin
**Products Manufactured/Supplied:** NEWS! Magil Corporation introduces the NEW "Blue MAG" machine for the MRL and Renovation market. Magil Corporation is a leader and an Innovator in the elevator industry. Products include Synchronous Traction Gearless Machines, VVVF, AC Motors, Encoders; Traction Gears, Submersible Hydraulic Motors, HomeLift, Door Locks (swing doors) and high strength Wire Rope and Fixtures. Magil Corporation, is the most comprehensive provider of Elevator/Lift systems today. Magil offers product and engineering solutions for low-rise, mid and high-rise buildings; while providing expertise in rotating electrical equipment; geared and gearless machines and motors. Magil Corporation's market is international.

## MAYR ANTRIEBTECHNIK

EICHENSTRASSE 1
D-MAUERSTETTEN, GERMANY D-87665
**Telephone:** (49) 8341-8040
**Fax Number:** (49) 8341-804421
**E-Mail:** info@mayr.de
**Web Site:** www.mayr.de
**Marketing Contact:** Dipl.-Ing. (FH) Hans Eberle
**Engineering Contact:** M. SC. Dipl.-Ing. (FH) Bernd Merk
**Sales Offices:** USA (201) 445-7210, France 03/21729191, Italy 049-8791020, UK 01535/663900, Switzerland 052/6740870, Singapore 0065/65601230, China 0086/51258917562
**Products Manufactured/Supplied:** Safety brakes for passenger lifts, hoists, goods elevators, escalators as well as shaft couplings and torque limiters.

## MAROONE STAINLESS

M-30, STREET NO. 8, APIA,
NEW ROHTAK ROAD
NEW DELHI - 110 005
**Telephone:** 0091 9818144650
**Fax Number:** + 91 11 43507984
**E-Mail:** info@maroone.in
**Web Site:** www.maroone.in
**Contact:** Mr. Sanjeev
**Products Manufactured/Supplied:** Stainless Steel Designer Sheets - N8 Mirror, Hair Line & N4, Vib (Vibration), Titanium Coated, Etched Sheet.

## MARUTI ELEVATOR

C-1/24 G.I.D.C ESTATE
NARODA, AHMEDABAD
GUJARAT-INDIA 382330
**Telephone:** 0091-079-22821429
**Fax Number:** 0091-079-2821429
**E-Mail:** info@marutielevator.com
**Web Site:** www.marutielevator.com
**Marketing Contact:** Mr. Bipin Patel
**Engineering Contact:** Mr. Manoj Patel
**Products Manufactured/Supplied:** AC-1, AC-2 and V3f geared lift machines, Electric Motors, Brakes, Safety Gears, Governors, Gate Locks, Door Operator, Deflactor pulley, Main drive Sheaves, Car & Counterweight frames, Guide Shoes, Retiring Cam & Striker, Replacement Parts for OTIS, Guide Rails, Cages, Brackets, Doors.

## MATTEX

5079, BHANDUP INDL. ESTATE
L.B.S. MARG, BHANDUP (WEST),
MUMBAI 400078
**Telephone:** 02232972130
**Mobile:** 9322292675
**E-Mail:** mattex@vsnl.net, anto@mattexpower.com
**Web Site:** www.mattexpower.com
**Products Manufactured/Supplied:** Mattex manufactures a full range of elevator passenger safety and information products to the Indian market. Our products are LED dotmatrix displays, LCD graphic, segment and dotmatrix displays with any communication types like parallel, serial and can. We also manufacture emergency light and LED lights for lift cabin.

## MESSUNG SYSTEMS PVT. LTD.

EMERALD HOUSE,
EL-3, J BLOCK
MIDC, BHOSARI, PUNE - 411 026, INDIA
**Telephone:** +91 20 2710 2000
**Fax Number:** +91 20 2710 2100
**E-Mail:** marketing@mspl.messung.com
**Web Site:** www.messung.com
**Contact:** Mr. K.T. Chougule
**Products Manufactured/Supplied:** V3F Drives, Programmable Logic Controller, Remote I/O Systems, HMI

## MONTANARI GIULIO & C. SRL

VIA BULGARIA 39
41100 MODENA, ITALY
**Telephone:** (39) 059-453611
**Fax Number:** (39) 059-315890
**E-Mail:** montanari@montanari-giulio.com
**Web Site:** www.montanari-giulio.com
**Marketing Contact:** Alessandra Bezzi
**Engineering Contact:** Mr. Stefano Bertoni
**Sales Offices:** Mr. Marcello Bellei
**Products Manufactured/Supplied:** Lift Gears for Goods and Passengers, Gearless, Safety Devices (Speed Governors & Tension Devices, Instantaneous and Progressive Safety Gears, One way and Bi-Directional), Mechanical lift accessories, Frequency controllers

## MONTEFERRO S.P.A.

VIA COMO, 11
21020 MONVALLE (VARESE)
**Telephone:** +39 0332 798879
**Fax Number:** +39 0332 971016
**E-Mail:** customer.service@monteferro.it
**Web Site:** www.monteferro.it
**India Contact:** Mr Kumar
**Mobile Number:** +919739982517
**Marketing Contact:** Mr Kumar (kumar@monteferro.it); Mr Marco Bodio (marco.bodio@monteferro.it)
**Products Manufactured/Supplied:** Standard elevator guide rails for application below two metres per second and for average load capacity; high-speed elevator guide rails for usage in high load, high frequency, high speed and special applications; matched high speed elevator guide rails that Monteferro have a set standard for the highest speed elevator market segment; Fish plates - standard, double thick, T-plates, minimum clearance seismic; Clips - sliding clips, forged clips, sliding clamp, T-clips; Accessories - clip kits, anchor bolt kits, shim kits.

## ORIENT WIRE ROPES

30-B, INDUSTRIAL AREA,
SANWER ROAD
INDORE, MADHYAPRADESH
452 015, INDIA
**Telephone:** 0091 731 2721912, 2720456
**Fax Number:** 0091 731 2721364
**E-Mail:** (A) mail@orientwireropes.com
(B) orientwireropes@dataone.in
**Web Site:** www.orientwireropes.com
**Marketing Contact:** 09406853459
**Engineering Contact:** 09826047187
**Sales Office(s):** 0091 731 2721912
**Products Manufactured/Supplied:**
1) Steel Wire Ropes 2) Steel Wire Rope's Sling

## PEELLE

195 SANDALWOOD PKWY W.,
BRAMPTON, ONTARIO, CANADA, L7A 1J6
**Telephone:** 905-846-4545
**Fax Number:** 905-846-2161
**E-Mail:** exportsales@peelledoor.com
**Web Site:** www.peelledoor.com
**Sales Contact:** Jose Vilchez
**Engineering Contact:** Frank Leo
**Sales Offices:** United States (800) 645-1056; International (800)787-5020
**Products Manufactured/Supplied:** Bi-parting and Slide-up Freight Elevator Hoistway Doors, Car Door (Gates), Motorized and manual, Freight Elevator Car (Cab) Enclosures, Channel Iron Entrance Frame/Sill assemblies, Wiring Materials and World Wide Installation. Materials to Motorize and/or Modernize the Existing Freight Elevator equipment of any manufacturer. Center opening doors specifically designed for freight elevator applications.

## PEPPERL + FUCHS (INDIA) PVT. LTD

B, PLOT NO. 10, 3RD MAIN, 1ST STAGE,
PEENYA INDL. ESTATE BANGALORE - 560 058
**Telephone:** 0091 80 28378030, 28395585
**Fax Number:** +91 80 2837 8031

**E-Mail:** fa-info@in-pepperl-fuchs.com
**Web Site:** www.pepperl-fuchs.com
**Contact:** Ms. Deepika Arora
**Products Manufactured/Supplied:** Inductive Sensor, Photoelectric Sensors, Capacitive and Magnetic Sensors, Ultrasonic Sensor, Positioners, Distance Measurement Units, Data Transmission Light Beam System, Vision Sensor and Solutions, Sensor for Door, Gates and Elevators, Safety Sensor and Control Units, Incremental and Absolute Rotary Encoders, Position Encoding System - WCS, Identification System: RFID, BAR CODE, DATAMATRIX, AS - Interface Solution, Counters, Tachometers, Speed Monitor, Converter, Displays.

## PHYSICAL MEASUREMENT TECHNOLOGIES

BOX 400, 4 LING STREET
MARLBOROUGH, NEW HAMPSHIRE 03455 USA
**Telephone:** (603) 876-9990
**Fax Number:** (603) 876-9995
**E-Mail:** lorsbachgp@monad.net
**Web Site:** www.pmtvib.com
**Marketing Contact:** Gregory P. Lorsbach
**Engineering Contact:** Gregory P. Lorsbach
**Sales Offices:** Jude M. Wright, wrightjm@pmtvib.com
**Products Manufactured/Supplied:** EVA-625 Elevator & Escalator Vibration Analysis System; EVA Vibration Analysis Tools Software; IMD-1 Escalator Step/Skirt Performance Index Measurement Device; MMC-1 Multi-Measurement Data Collector; ETCH01 Tachometer Module.

## PREMIUM ENERGY TRANSMISSION LTD.

PB 5, MUMBAI - PUNE ROAD,
CHINCHWAD, PUNE - 411019, INDIA
**Telephone:** +91 20 66314112
**Fax Number:** +91 20 27450287
**E-Mail:** rao.s.n@petltd.com
**Web Site:** www.premiumtransmission.com
**Contact:** Mr. S.N. Rao
**Products Manufactured/Supplied:** Manufacturers of complete assembly of elevator machine, elevator gear box/geared motor for lift door opening/escalator/luggage conveyor, etc.

## PRISMA DSA INDUSTRIES (INDIA) PVT. LTD.

A-20, CROSS ROAD "B", MIDC, ANDHERI EAST
MUMBAI 400 093
**Telephone:** +91 22 67429700 / 701
**Fax Number:** +91 22 29209159
**E-Mail:** info@prismadsa.com, marketing@prismadsa.com, sales@prismadsa.com
**Web Site:** www.prismadsa.com
**Contact:** Mr. Ashok Subhedar
**Products Manufactured/Supplied:** Elevator Controllers and allied products, Fabrication Services - CNC Fabrication, Water Jet Cutting Systems & Services.

## RASSEGNE SPA - LIFT

VIA VARESINA 76
MILANO, 20156 - ITALY
**Telephone:** +39 02485501
**Fax Number:** +39 02 48550479
**E-Mail:** lift@fieramilano.it
**Web Site:** www.liftitalia.com/ita.html
**Marketing Contact/Sales:** Costantino Cutroneo, EXT +39 048550324
**Products Manufactured/Supplied:** International Exhibition of elevators, components, accessories, trade publications and services

## M/s REVATHI ENTERPRISES

F 104, MADHUBAN, NEAR MTNL BLDG AND DAHISAR TOLL POST. WESTERN EXPRESS HIGHWAY, DAHISAR (EAST),
MUMBAI 400068, INDIA
**Telephone:** +91 22 28972184, 3184
**Fax Number:** +91 22 28978643
**E-Mail:** hctawde@gmail.com; hct@revathi.com
**Web Site:** www.revathienterprises.com
**Contact:** Hemant Tawde
**Products Manufactured/Supplied:** Elevators Cars, Doors, Frames and Precision Fabricated Assembies using CNC laser technology.

## SAVERA INDIA RIDING SYSTEMS CO. PVT. LTD.

PLOT NO. D-22, TALOJA, MIDC INDUSTRIAL AREA, TALOJA -410208, DISTRICT RAIGAD
MAHARASHTRA, INDIA
**Telephone:** 0091 22 27402300/01
**Fax Number:** +91 22 2740 2302
**E-Mail:** a.pawar@saveraindia.com
**Web Site:** www.saveragroup.com
**Contact:** Mr. Ajay Pawar
**Products Manufactured/Supplied:** "Super" Guiderails that can be used in lifts with speeds between 0 - 1.6 m/sec. machined.

## SCHAEFER GMBH

WINTERLINGER STR. 4
72488 SIGMARINGEN GERMANY
**Telephone:** (49) 7571-722-22
**Fax Number:** (49) 7571-722-99
**E-mail:** info@ws-schaefer.de
**Web Site:** www.ws-schaefer.de
**Marketing Contact:** Mr. Michael Gubisch, Managing Director
**Engineering Contact:** Mr. Michael Gubisch, Managing Director
**Sales Offices:** Mrs. Ilona Hanke
**Products Manufactured/Supplied:** Push Buttons and/or Push Button Stations; Signal Fixtures; Voice Synthesizers; Intercom Systems; Access Control Systems; Lift Info Systems

## SCHMERSAL INDIA PVT. LTD.

7TH FLOOR, VATIKA TRIANGLE
BLOCK A, SUSHANT LOK PHASE 1
MEHRAULI - GURGAON ROAD
GURGAON - 122002, INDIA
**Telephone:** +91 124 4342300
**Fax Number:** +91 124 4342333
**E-Mail:** info-in@schmersal.com
**Web Site:** www.schmersal.in
**Contact:** A.S. Senthil Kumar
**Products Manufactured/Supplied:** Door Contacts with Positive Breaks, Magnetic Reed Switches, Door Locks, Position Switches, Floor Switches, Position Systems.

## SEMATIC ITALIA S.P.A.

VIA ZAPPA COMM.FRANCESCO, 5
OSIO, SOTTO (BERGAMO)
24046 ITALY
**Telephone:** +39-035-4815100
**Fax Number:** +39-035-4815199
**E-Mail:** infosem@sematic.com
**Web Site:** www.sematic.com
**Marketing Contact:** Dr. Ing. Marcello Personeni
**Engineering Contact:** Dr. Ing. Roberto Zappa
**Sales Office(s):** sales@sematic.com
**Products Manufactured/Supplied:** Automatic entrances for elevators. Operators, full glass entrances, framed glass entrances specifically designed for panoramic installations, round doors are also available. Last Product Lines developed: entrances for modernization and for inclined elevators. Entrances are fire rated, vandal resistant, for marine application, for saline or dusty atmospheres or exposed to adverse weather conditions with high humidity and falling water.

## SETTIMA MECCANICA

VIA BERLINGUER 1
SETTIMA (PC) 29020 ITALIA
**Telephone:** +390523 557623
**Fax Number:** +390523 557256
**E-Mail:** info@settima.it
**Web Site:** www.settima.it
**Marketing Contact:** Ferraresi Simone
**Engineering Contact:** Cagnani Pierpaolo
**Sales Office(s):** Ferraresi Simone
**Products Manufactured/Supplied:** Screw pumps

## SHANGHAI BST ELECTRIC CO., LTD

DA-MAIWAN INDUSTRIAL ZONE,HANGTOU,NANHUI, SHANGHAI,CHINA
SHANGHAI 201316 CHINA
**Telephone:** 86-21-58222286
**Fax Number:** 86-21-58221353
**E-Mail:** export@shbst.com
**Web Site:** www.shbst.com
**Marketing Contact:** Ms. Shelley Zhou
**Engineering Contact:** Ms. Xiaodi Zhu
**Sales Office(s):** International Business Dept.
**Products Manufactured/Supplied:** Shanghai BST has the multi-processing capability for electrical, mechanical, electronical, plastic, cable products. BST is specialized in manufacturing of elevator and escalator electrical components, which includes: Car operation panel, Landing fixtures, Push button, PCBA, Hoistway fixtures, Control system, Cable, Cable harness etc.

## SHARP ENGINEERS

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CROSS ROAD 12, GIDC,
KATHWADA
AHMEDABAD, INDIA
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**Fax Number:** +91 79 22901716
**E-Mail:** info@sharpengineers.com
**Web Site:** www.sharpengineers.com
**Contact:** Mr. Mitul Patel
**Products Manufactured/Supplied:** Elevator Machines & Spares.

## SKYLINE INDIARECRUIT.COM PVT. LTD.

44, DECCAN COURT,
259-SV ROAD, BANDRA WEST
MUMBAI, MAHARASHTRA 400050 INDIA
**Telephone:** (+91 22) 2655 8076
**Fax Number:** (+91 22) 2651 4750
**E-Mail:** elevators@indiarecruit.com
**Web Site:** www.elevator-jobs.com
**Products Manufactured/Supplied:** Recruitment of Elevator Trained Personnel

## TAK CONSULTING PVT. LTD.

303, GALLERIA,
HIRANANDANI GARDENS, POWAI
MUMBAI - 400 076
**Telephone:** +91 22 2570 7498 / 3263 8551
**Fax Number:** +91 22 2570 7499
**E-Mail:** tak.mathews@takconsulting.net
**Web Site:** www.takconsulting.net
**Contact:** Mr. Tak Mathews
**Products Manufactured/Supplied:** Design, Project, Service, Modernization & Traffic Analysis Consultants for Elevators, Escalators and Moving Walks.

## TL JONES INDIA PVT LTD

202 HYDE PARK

SAKI VIHAR ROAD, ANDHERI-EAST
MUMBAI 400 072 INDIA

**Telephone:** +91 22 4215 0700/01/02/03
**Fax Number:** +91 22 4200 0789
**E-Mail:** info@tljones.com
**Web Site:** www.tljones.com
**Marketing Contact:** Dinesh Musalekar, Tel +91 22 6526 0345 / 6
**Engineering Contact:** Rajesh Dharne, Tel +91 22 6526 0345 / 6
**Sales Office(s):** Mumbai (Tel: +91 22 6526 0345 / 6); New Delhi (Tel: +91 1 2553 7775); Chennai (Tel: +91 44 4308 1447)
Also: Singapore, Christchurch, Shanghai, Guangzhou, Beijing, Chongqing, Dubai, Tokyo, London, New York.
**Products Manufactured/Supplied:** TL Jones India supplies a full range of elevator passenger safety and information products to the Indian market. This includes world leading infrared door safety edge brands Microscan™ and Panachrome, plus E-Motive brand elevator multimedia & TFT displays, emergency communications systems, annunciators, gongs, LED lights, photo sensor switches, lift monitoring systems and various accessory products.

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THE TECHNÍCAL ACADEMY OF HEÍLBRONN E. V.
MAX-PLANCK-STRAßE 39
74081 HEÍLBRONN
GERMANY
**Telephone:** +49 (0) 7131 / 56 80 63
**Fax Number:** +49 (0) 7131 / 56 80 65
**Web Site:** www.hs-heilbronn.de/TAH/EnglishTAH
**E-mail:** tah@hs-heilbronn.de
**Contact:** Prof. Dr. G. Clauß
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SIPCOT IND. PARK SRIPERUMBUDUR
MAMBAKKAM & PONDUR 'A' VILLAGE
SRIPERUMBUDUR TALUK,
KANCHEEPURAM DIST. 602106
TAMIL NADU, INDIA
**Telephone:** +91 (0) 44 2716 8013
**Fax Number:** +91 (0) 44 2716 8012
**E-Mail:** commercial.in@fermator.com
**Web Site:** www.fermator.com
**Marketing Contact:** Krishnan Ramanarayan
**Products Manufactured/Supplied:** Automatic Doors for Passenger and Goods Lifts

## UT LIMITED

14, PRINCEP STREET
KOLKATA – 700 072
**E-Mail:** mails@utlift.in

## VIRGO COMMUNICATIONS PVT. LTD. & EXHIBITIONS

#132, 1ST FLOOR, 5TH CROSS,
CAMBRIDGE LAYOUT
BANGALORE - 560 008, INDIA
**Telephone:** +91 80 2556 7028/29, 4149 3996/97
**Tele-Fax Number:** +91 80 2556 7028/29
**E-Mail:** info@virgo-comm.com, anitha@virgo-comm.com, raghu@virgo-comm.com, thomas@virgo-comm.com
**Web Site:** www.virgo-comm.com,
**Marketing Contact:** Ms. Anitha Raghunath & Mr. G. Raghu
**Sales Office(s):** Mr. Thomas T. Abraham
**Products Manufactured/Supplied:** Organizers of India's mega exhibition and seminar on Elevator & Escalator technology - International Elevator & Escalator Expo (IEE Expo). Other exhibitions being organized are: (i) IEE Expo - Tech Forum (ii) India International Adhesives & Sealants Expo (IIASE) (iii) International Power Transmission Expo (IPTE - A Gear Technology Event).

## VIRGO PUBLICATIONS

#132, 1ST FLOOR,
5TH CROSS, CAMBRIDGE LAYOUT
BANGALORE KARNATAKA 560008 INDIA
**Telephone:** +91 80 2556 7028, 2556 7029, 4149 3996, 4149 3997
**Tele-Fax Numbers:** +91 80 2556 7028, 2556 7029
**E-Mail:** anitha@virgopublications.com, raghu@virgopublications.com, info@virgopublications.com
**Web Site:** www.elevatorworldindia.com
**Marketing Contact:** Ms. Anitha Raghunath & Mr. G. Raghu
**Sales Office(s):** Mr. Thomas T. Abraham
**Products Manufactured/Supplied:** Publishers of Elevator World India magazine in association with Elevator World Inc., USA

## WITTUR

ROHRBACHSTRASSE 28
WIEDENZHAUSEN, GERMANY 85259
**Web Site:** www.wittur.com
**Marketing Contact:** see website ("Contact us" section)
**Engineering Contact:** see website ("Contact us" section)
**Sales Office(s):** see website ("Contact us" section)
**Products Manufactured/Supplied:** see website ("Product navigator" section)

## WURTEC, INCORPORATED

6200 BRENT DRIVE
TOLEDO, OHIO 43611
**Telephone:** (419) 726-1066
**Toll-Free:** 1-800-837-1066
**Telephone:** (419) 729-5764
**E-Mail:** sales@wurtec.com
**Web Site:** www.wurtec.com
**Marketing Contact:** Julie Kreienkamp
**Engineering Contact:** Steven Wurth
**Products Manufactured/Supplied:** Guide Rail Install/Align Tools; False Cars; Roping and Hoisting Equipment; ADA Phone Systems; Oil Filtering Systems; Safety and Electrical Equipment; Power & Hand Tools; Test & Measuring Equipment; Material Handling & General Purpose Tools; Hydraulic Tools; Elevator Components

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