ADSIMULO – AN EXPERT SYSTEM FOR THE DESIGN OF PASSENGER LIFT SERVICES

K. Zienowicz, A. Godwin, P. Smolenski, C. Meng and C. Manning
Lerch Bates Ltd., United Kingdom

With computing power ever cheaper the author has led a development team to produce an independent design application that ensures that the most space efficient "elevatoring" solutions are identified automatically for any proposed building. The application is claimed to be a world's first and is also capable of delivering visualisation of passengers using the lift services as well as generating a generic BIM output file for the building designer. The simulations run very fast and typically can handle 1500 hours of simulations in around two minutes. Such gains in productivity are vital to ensuring clients receive best advice promptly.

A LOAD & TEMPERATURE COMPENSATION METHOD FOR GREEN HYDRAULIC LIFTS BY MEANS OF INVERTERS

Dr. K. Ferhat Celik
Blain Hydraulics GmbH, Germany

Use of inverters in hydraulic lifts has decreased energy consumption, allowed smaller motor sizes and provided good ride performance for heavily used lifts. Though the general trend in the lift industry is towards lifts with lower energy requirement, use of hydraulic lifts with inverter has not found enough appeal yet. This is because of the fact that existing solutions are generally more demanding, rather costly and maintenance requires high level of expertise. A new solution that is compact, simpler to implement and inexpensive to compete with advantages of the conventional hydraulic elevator system is necessary to make energy efficient solutions attractive.

When inverters are used at hydraulic power units, it is important to have accurate speed regulation regardless of load and temperature variations. Screw pumps are extensively used for hydraulic lift power units. Amount of leakage of screw pumps largely vary with the oil temperature and car load (pressure). With the use of an inverter the pump outputs just enough flow for the targeted speed. When pump leakage increases due to higher load and/or oil temperature, the car speed decreases which results in longer travel time and uncomfortable ride. Leakage of the pump can increase at elevated pressures such that supplied flow could not be enough to move the car during the leveling run. Therefore, pump flow should be regulated according to the load and oil temperature to assure targeted speed and good ride-quality.

In this paper, economic-efficiency of hydraulic lifts is underlined and a new sensor-less load compensation solution is introduced to assure targeted speed under all load conditions. The solution basically consists of an inexpensive control valve and inverter with a sophisticated hydraulic software module. The new solution does not require an interface between the control valve and the inverter such as pressure/load sensor, flow meter or electronic

boards etc, works with open loop control and provides accurate speed regulation regardless of the load condition. In addition, control valve and its adjustments are simplified and no encoders in the shaft or on the motor are used. The solution also provides an extra energy saving mode, where speed of the elevator is varied according to the load condition by assuring the minimum travel time. All these advantages not only make the solution an energy efficient one but also an economically-efficient one as well. The paper gives the details of the idea used and features implemented in the development of the control valve and the advanced inverter software.

ADJUSTABLE CONNECTIONS TO CONCRETE ELEVATOR SHAFTS

Chris Gage
Regional Manager North America, Halfen GmbH, Germany

This paper will present a review of cast-in and adjustable anchor channel connections for use in the elevator shaft. The accurate positioning of elevator guide rails, divider beams and elevator doors to concrete will be illustrated. In addition to an explanation of the application and user benefits derived from this type of anchoring system, the paper includes a discussion of static, seismic, and dynamic loading situations plus a review of an installation example at Ti, World Trade Center, New York.

AN ADVANCED ELEVATOR MAINTENANCE NETWORK AGAINST A HUGE SEISMIC DISASTER

Motoyoshi Nakamura, Yasuhiro Shibata and Kouzou Mabuchi
Hitachi Building Systems co., Ltd., Japan

The prompt restoring at the time of an earthquake is an important work for elevator maintenance companies in Japan.

To meet this mission, we have built up the powerful maintenance network systems which support the restoring work of the damaged elevators.

Our maintenance network functioned well against the Great East Japan Earthquake which occurred at 2:46pm on 11th March, 2011.
However, new problems appeared at the same time.

Especially, avoidance of entrapment in a car resulting from the planned rolling blackout due to the shortage of electric power is important.
The current situation and future work of our elevator maintenance network system are presented.

AVERAGE WAITING TIME OF DESTINATION CONTROL SYSTEMS

Hitoshi Aoki
Elevator Laboratory Ltd., Japan

There are two types of Destination Control Systems

(1)Conventional type: each zone is served by a group of elevators incorporating conventional collective control. And each group equips destination call buttons at every floor.

(2)Nucleus type: each zone is served by several groups of two elevators incorporating advanced collective control. And each group equips allotted destination call buttons.

This paper shows that Average Waiting Time of Conventional type becomes (1+alpha) RTT/4 and That of Nucleus type becomes (1+alpha)RTT/8. Where, alpha is a proportion of passengers arriving at the main lobby and RTT is an average of round trip times.

COMPARISON OF SIMULATION MODELS FOR ELEVATOR SYSTEMS

Dipl.-Ing. Ingo Pletschen[1], Dr.-Ing. Stephan Rohr[1] and Prof. Dr.-Ing. Ralph Kennel[2]
[1]ThyssenKrupp Aufzugswerke, Germany
[2]Technische Universität München, Germany

Good simulation models of elevator systems are needed in many cases. For example to calculate the energy consumption, to test new algorithms for position, speed and current controllers or to simulate the elevator for HIiL-test benches. As the rope has a continuous mass the best way to model an elevator is over partial differential equations (PDE), which are however unhandy to deal with in simulations. Therefore in a first model the rope is assumed by a massless spring, while the rope masses are concentrated in the counterweight and cabin. In a second model the rope is divided into many finite elements, each consisting of a spring with attached lumped masses. It is compared how well the models fit to the solution of the PDE and how many finite elements are reasonable.

COMPLEX WIRE ROPE MODELS FOR LIFTS

Cengiz Erdönmez[1] and C. Erdem İmrak[2]
[1]Istanbul Technical University, Institute of Informatics, Computational Science and Engineering Program, Turkey
[2]Istanbul Technical University, Faculty of Mechanical Engineering, Mechanical Engineering Department, Turkey

Wire ropes have many practical application areas, some of them are elevators, bridges, lifting systems, mines, cranes etc. Wire ropes are designed using helical shaped wires. Single and double helical wires are used during the modeling issue. A basic part of the wire rope is called strand. An independent wire rope core (IWRC) is built by wrapping wire strands. To model a more complicated wire rope such as Seale IWRC, Seale part is wrapped around an IWRC. In this paper complicated modeling issue for a Seale IWRC is proposed. Numerical models gives opportunity to establish tests over the problems confronted during the applications of wire ropes. The proposed model gives wire by wire numerical results for wires within the specific wire rope model.

CULTURAL CHALLENGES TO ELEVATORING – CASE STUDY INDIA

T A K Mathews
TAK Consulting Pvt. Ltd., India

The primary objective of elevatoring a building is to facilitate circulation and movement of people (and goods) within a building. To this end it is vital to understand why and how people need to move which is largely dictated by their living habits. Living habits in turn are largely governed by the culture background and societal influences.

This paper will contrast elevatoring norms prevalent internationally and the impact of cultures using living patterns in India as a case study. The paper will establish that the impact of variances in cultural nuances on elevatoring can be significant.

DEVELOPMENT OF AN ACTIVE ELEVATOR MONITORING DEVICE

Xingjun WU, Yingjie LIU, Xinghua Wang, Weixiong Wang and Chao Xie
Guangzhou Academy of Special Equipment Inspection & Testing, China

Elevator safety gains more and more importance in nowadays, elevator monitoring device help to improve the safety state of elevator by detecting malfunction beforehand, and also help to facilitate the rescue work by sending fault signal immediately to rescue teams by GPRS. Guangzhou Special Equipment Inspection Institute which is an elevator safety inspection and research institute in Guangzhou city of China, devotes its effort to develop an active elevator monitoring device, its major feature lies in the utilized signal is the current sent to the frequency converter which is indirectly measured by an non-contact current sensor, through analyzing the change rate of the current and comparing with the recorded normal elevator running data, it can be obtained whether the elevator runs at normal state or malfunction state, this paper introduces the configuration and working principle of the developed device, experiment test results also are shown to validated the function of the device.

DIFFICULTIES IN COMPARING THE RESULTS OF LIFT TRAFFIC SIMULATIONS

Hans M. Jappsen and Olaf Rieke
Jappsen Ingenieure,Germany

Our presentation is a follow-up of our last Elevcon session about the “Difficulties in comparing the results of lift traffic simulations”.

During the last decade Destination Control Systems (DCS) have displaced Conventional Control Systems for new high rise lift installations and for most lift refurbishments.

Software based control algorithms play the main role in the DCS dispatching process.

Driven by this circumstance lift traffic analyses for DCS installations are usually carried out by simulations rather than by standardized Round-Trip-Time (RTT) calculations.

Every lift company and every lift consultant use different simulation tools with different algorithms and different procedures, so results are not comparable to each other. Furthermore internationally agreed assessment criteria for these results – as they do exist for the RTT method - are missing.

Lift engineers and investors need reliable and comparable lift analysis results based on accepted procedures and benchmarks.

We will present a baseline lift traffic analysis method for Destination Control Systems adapted from a modified RTT calculation in order to sustain the discussion about this unsolved problem.

ELECTRIC SITE SURVEY – IN QUEST OF ELEVATOR PARAMETERS

Risto Kontturi[1] and Tapio Tyni Dr. (Tech) [2]
[1]Director High-Rise Modernization, KONE Corporation, Finland
[2] Senior Research Specialist, Energy & Eco Efficiency, KONE Corporation, Finland

In elevator modernization projects it is essential to know the system masses when engineering a new motor-drive system in the cases where existing hoist way mechanics is reused. Car acceleration together with the hoisting motor power will reveal the secrets of the elevator system parameters when state of the art sensor, measurement, modeling and optimization techniques are applied. The developed KONE ESiteSurvey™ method provides a comprehensive set of elevator system parameters readily after a round trip test run and out-of-service time less than 30 minutes. The parameters include e.g. masses, frictions, balancing, compensation, hoist motor and hoist way efficiencies. The method is now part of KONE standard modernization process in the high-rise segment.

ELECTRO-MAGNETIC VIBRATION ANALYSIS OF HIGH POWER ELEVATOR MOTOR

S. Noda[1], K. Ozaki[1], M. Matsushita[1] and I. Asami[2]
[1] Toshiba Corp., Japan
[2] Toshiba Elevator and Building Systems Corp., Japan

It is indispensable for vertical moving by an elevator installed in a low-rise building to a skyscraper. If the elevators were established near rooms, vibration of driving motors through floor or acoustic noise might not be endured for the habitants. The more downsize motor, that is increase of flux density from the motor, and lighter motor, that is lowering elasticity of construction, are, the more claim of nuisance by users have.

We analyzed these phenomena focusing on mode of electro-magnetic force by FEM and modal analysis. And then we verified this theory by experimentation. We found the vibration mode2 or 3, near-by natural frequency in elevator running against electro-magnetic mode 24. We will express our new standpoint of reduction to the electro-magnetic vibration in this paper.

ELEVATOR CERTIFICATION PROCESSES - GLOBAL APPROACH AND REGIONAL CERTIFICATION

Dirk Schroeter and Carsten Schumann

TÜV SÜD America, Inc., Inspection Services, USA

In the global world of today the manufacturers and installers of elevators and elevator components want to place their products on all markets.

The two existing approaches - the European Lift Directive (Certification of products) and the ASME A17.7/CSA B44.7 for North America (Certification of deviations) - are disparate in their application.

TUV SÜD as an AECO per ASME A17.7/CSA B44.7 (TUV SÜD America) and a Notified Body per European Lift Directive (TUV SOD IS GmbH) will explain the different elevator certification procedures to meet the applicable certification requirements.

ELEVATOR DESIGNS – ASIAN PERSPECTIVE

K. Rajah Venkatraman
Managing Director, Fortune Consultants, India

In the elevator industry – technical / visual features and their orientation – are incorporated in different elevators similar or dissimilar.

The design differences in the control system and machinery arrangements impact the installers and the building. The visual features used, their arrangements and orientations affect the users of the elevators. For example when a car driver / owner uses cars having different location of controls / gears etc. it leads to driving uncertainty. Similarly, such differences in elevators in different buildings frequented by the users such definitely puts users into uncertainty, discomfort, anxiety and at critical times panic even. These technical / visual features are reviewed in detail, in the “Asian Context”.

ELEVATOR VIRTUAL WINDOW REDUCES PASSENGERS STRESS AND ATTRACTS THEIR ATTENTION

Dmitry Gorilovsky[1] and Aleksey Gorilovsky[2]
[1]Product Manager, ST1 Aufzüge GmbH, Germany
[2]CEO, Stein Ltd, Russian Federation

The elevator industry sells visits where a success visit means getting there with the least stress.

The hardest stress originates from being torn from the environment. Panoramic elevators help but with certain limits.

The Elevator Virtual Window (EVW) solution provides the continuous informational contact with landscape and helps to release stress, increases the ride comfort.
EVW reconstructs the outer environment image inside the non-panoramic elevator in real time and synchronizes this image with actual car position. Basically it requires several cameras outside the building plus advanced computing to synthesize the final picture. Targeting minimizing of required viewing cameras and computing power we achieved overall hardware and maintenance costs reduction and minor impact on building facade.

A few cases are examined and aspects of further implementation described: landscape view transmitted from distinct location, proportionally increased speed of performed landscape view.
EVW helps to control the passengers' attention and when used correctly might not only release their stress but also delivers operator's content in most acceptable way.

ENERGY EFFICIENCY STANDARDS

Richard Fargo
Otis Engineering Center, System Engineering, USA

Energy reduction has been a general theme for some years now, but little attention had been paid to elevators and escalators, since they represent only about 5% of the energy use in a building. With successful efforts in improving the large energy consumers in buildings, such as HVAC and lighting, engineers are now looking to the smaller consumers of energy, such as elevators and escalators. This has spawned development efforts for numerous standards, regulations, classifications, and codes aimed at reducing the energy consumed by elevators and escalators. Many are being developed, both independently and at the same time without coordination between them, which may lead to diverse and possibly conflicting requirements.

This paper will introduce many of these activities, and provide information on their main focus, their differences, development status, area of coverage, links to their websites, etc. Specific standards under development which will be discussed include:
VDI 4707
ISO 25745-1 and -2
International Green Construction code

ASHRAE working group
NEII
LEED
BREEAM
CASBEE
E4 Project

ENERGY SAVING SOLUTIONS FOR HYDRAULIC DRIVES

Daniel Mettler[1] and Heinz Strickler[2]
[1]Bucher Hydraulics Inc., USA
[2]Bucher Hydraulics AG, Neuheim, Switzerland

This paper starts with an overview of hydraulic elevators worldwide, and the wide differences in hydraulic drive technologies present in the diverse markets.

In 4 steps to energy efficiency Bucher Hydraulics explain the technologies available for modernization as well as new build hydraulic drives, from the simple transition from mechanical to electronic control valves, up to the latest in VVVF drive technology.

Energy efficiency, elevator ride comfort, the elimination of heat build-up in the oil and regenerative drive systems for hydraulic elevators are also covered.

A special focus segment discusses developments and trends in the North American market, where the above modern technologies are only just beginning to gain momentum, accentuating the huge energy and money saving potential waiting to be tapped.

EVALUATING THE ELEVATOR ROUND TRIP TIME UNDER UP-PEAK TRAFFIC CONDITIONS USING THE MONTE CARLO SIMULATION METHOD

Lutfi Al-Sharif, Husam M. Aldahiyat and Laith M. Alkurdi

Mechatronics Engineering Department, University of Jordan, Jordan

The evaluation of the round trip time is fundamental to the design of vertical transportation systems. Calculating the round trip time for anything other than the most straightforward case becomes very complicated and requires the use of advanced special condition formulae. These formulae become even more complicated when a combination of the special conditions exist within the building being designed. The most four prominent examples of these special conditions are the case of multiple entrances to the building (as opposed to a single entrance), the case where the top speed is not attained in one floor journey, the case of unequal floor heights and the case of unequal floor populations. Moreover, no analytical formula exists for the combinations of all of these special conditions. The Monte Carlo simulation method can also be easily extended to cover a fifth special condition of Poisson passenger arrival model (as opposed to the constant passenger arrival model).

The use of the Monte Carlo simulation is presented in this paper as a simple and practical means to calculate the round trip time for an elevator during the up peak (incoming) traffic conditions, under a combination of any or all of the special conditions such as: multiple entrances, top speed not attained within one or more floor journeys, unequal floor heights and unequal floor populations.

HOW SAFE SAFETY IS?

John van Vliet
Liftinstituut, The Netherlands

The importance of standardization in safety related applications is free from any doubt. In the lift industry, legislation was drawn in respect to both safety achievement and unobstructed technological progress. However, fast technological progress limits the safety achievement for most of the in force legal documents. Modern components used in the lift industry adopted general or other domain's standards without taking into account the product's final application. This paper proposes the development of a framework for addressing the electric/electronic/ programmable electronic components in the lift industry. It is based on the current issues in the field and it is meant to ease the design, installation and operation of safety components based on modern technologies.

IMPLEMENTATION OF COUNTERWEIGHT ADJUSTMENT TO ACHIEVE ENERGY SAVINGS

Albert So[1], Conrad Wong[2] and Carmen Wong[3]
[1] Asian Institute of Built Environment, Hong Kong
[2] Yau Lee (Holdings) Ltd.,Hong Kong

[3] REC Green Technologies Ltd., Hong Kong

The first author of this article was involved in the development of a counterweight adjustment scheme for optimal energy consumption of a lift system. The basic principle was presented in Helsinki Elevcon in 2006 (Lam D.C.M., So A.T.P., Ng T.K., "Energy conservation solutions for lifts and escalators of Hong Kong housing authority", *Elevator Technology 16*, *Proceedings of 16th World Congress on Elevator Technologies*, IAEE, Helsinki, June, 2006, pp. 190-199). Theoretically speaking, if the lift car is lightly loaded, a lower counterweight setting could save energy and vice versa. However, traffic patterns are often complicated and it is difficult to determine the optimal counterweight setting. Recently, the scheme was applied to a hotel project developed by the second author through the third author as a contractor. A tailor made software was compiled while a set of contractual procedures was developed with the maintenance contractor of the lift manufacturers. Data was obtained to show that energy saving was accomplished by all means. The procedures of calibrating the whole system will also be discussed in this article.

PNEUMATIC VACUUM ELEVATORS: A PRODUCT AND TECHNOLOGY OVERVIEW

Stefan Gruber
Pneumatic Vacuum Elevators, LLC, Miami, USA

Pneumatic Vacuum Elevators are self-supporting, air driven elevators that do not require a shaft, pit, or machine room.
The presentation will cover the following:
-Distinguish the differences between a PVE and traditional elevators,
-Understand the new technology of vacuum elevators,
-Determine proper applications and installation requirements for a PVE,
-Understand and apply benefits of a PVE as it relates to sustainable design

INTEGRATED ELEVATOR BRAKE

Karl Weinberger
Senior Vice President New Technologies, Schindler Elevator Ltd., Switzerland

We propose an integrated elevator brake system located at the car, which combines the functionality of the safety gear and the machine brake. Different concepts which include various actuating mechanisms are presented. The brake system itself is controlled by an advanced SIL3 supervision with two channel sensorics and electronics. The integrated brake system has the potential to be the basis technology for future elevators, which may incorporate for example alternative traction concepts. We discuss the system benefits of the integrated elevator brake in detail, before we conclude the paper by showing some results of a realized test system.

INNOVATION WITH SAFETY IN THE ELEVATOR INDUSTRY

Louis Bialy, PE
Director Worldwide Codes and Standards, Otis Elevator Company, USA

As the world economy becomes increasingly international, a consistently high level of safety is expected by the public. At the same time there is a worldwide demand for safe, reliable, innovative products. A process for ensuring safety while enabling innovation has been developed under the ISO umbrella and forms the basis of Performance Based Codes. The fundamental ISO process and its application in National Standards is described in this paper. Trends towards performance based standards worldwide, is also discussed.

LIFTS ENERGY CONSUMPTION IN GREECE: EXISTING SITUATION AND POTENTIAL SAVINGS

Lazaros Asvestopoulos and Nickos Spyropoulos
Kleemann, Greece

Despite of the relatively low population of Greece, there are about 400.000 lifts in operation. This study focuses on the energy consumed by these lifts in a period of one year. The study is based on energy measurements carried out on lifts of diverse technology and on an estimate of the number of existing lifts representing each type of technology. Finally, an estimation is provided of the potential annual energy savings that will result from a potential modernization of existing lifts using the available technology.

METHODS FOR THE SAFETY INTEGRITY DETERMINATION OF AN E/E/PE SYSTEM

Anca Mutu, Yusong Pang and Gabriel Lodewijks
Faculty of Mechanical, Maritime and Materials Engineering, Transport Engineering and Logistics, The Netherlands

Systems comprised of electrical, electronic and/or, more recent, programmable electronics (E/E/PE) are widely in use for performing safety functions. There is a major interest in the correct modeling and safety integrity determination of these systems, as their unavailability might lead to catastrophic situations. This paper reviews current approaches to determining the safety integrity of an E/E/PE safety related system. It filters these methods by the specifics of the lift industry and it proposes an applicable solution. A practical example of an E/E/PE system performing a safety function from the lift industry is given and its safety integrity determination is modeled with respect to the chosen techniques.

MODELLING AND ANALYSIS OF GUIDE RAIL BRACKETS AND ATTACHING PARTS

Serkan Elmali[1], Mehmet Altuntaş[1], C. Erdem İmrak[2] and Sefa Targit[3]
[1]Istanbul Technical University, Institute of Science And Technology, Turkey
[2]Istanbul Technical University, Faculty of Mechanical Engineering, Mechanical Engineering Department, Turkey
[3]ASRAY Guide Rail Company, Turkey

Elevator systems consist of too many components and guide rails which guide the car and the counterweight in their vertical travel and stop and hold the car on the application of the safety gear are the most important ones in terms of elevator safety. Guide rail brackets are positioned at regular distances from each other along the rail to fasten the rail to the shaft, and also attached to rail guide and teh shaft with the aid of attaching parts (clips and bolts). In this study, guide rail brackets and attaching parts realted to anchoring the guide rails have been modeled for finite element analysis. Stress and deflection analysis of the guide rail brackets have been executed for different loading conditions and different forces application points between two rail brackets. Additionaly, the test aparatus has been designed for experimental stress analysis of clips and bolts while applicating different loading conditions.

MODELLING OF PASSENGER FALLS ON ESCALATORS AND THE CONTROL OF BRAKING SYSTEMS TO PREVENT THEM: PUTTING IT ALL TOGETHER

Lutfi Al-Sharif

Mechatronics Engineering Department, University of Jordan, Jordan

Passenger falls on escalators are one of the major causes of accidents. Falls can either be passenger caused or escalator caused. Unplanned stops of escalators can cause passenger falls and consequential injury in the form of cuts, bruises, finger entrapment and in certain cases crushing leading to suffocation.

This paper links up a number of pieces of work together in order to develop a general framework for the model of escalator stop-initiated passenger falls on escalators and link them to methods of preventing them on escalators by the control of the escalator braking system.

Practical site investigation is carried in order to understand the relationship between the kinematics of a stopping escalator and the passenger comfort. The results show that the acceleration is the major driving factor in the passenger comfort on a stopping escalator.

Further modelling work is then carried out in order to understand the kinematics of passenger falls on escalators. It simulates the effect of an acceleration signal on a rectangular block. The most important parameter of the rectangular solid block is the centre of gravity ratio which is defined relative to the axis around which the fall can take place. The model is then verified using time lapse photography.

The use of escalator braking systems in order to control the deceleration of a stopping escalator is then overviewed. Two technologies exist for control the escalator braking systems: electrical and hydraulic. Both systems are reviewed and compared in the last part of this paper.

NEW DESIGN PROVISIONS FOR ANCHOR CHANNEL FASTENINGS ACCORDING TO CEN

Dr. Michael Merz
Hilti Corporation, Liechtenstein

Architects specify cast-in anchor channel to avoid rebar hits when drilling anchor holes. Design based on the German National Approval (DIBt) dates back to the early 70ies and is based on steel failure. The new European Code CEN-TS 1992-4 comprehensively covers anchor channel design featuring partial safety factors, verifications for ALL failure modes and flexibility in design through various parameters.
This paper discusses the structural differences in the two design concepts. The verification flow of anchor channel design is briefly described. Lastly, the benefits in terms of additional safety and cost efficiency in rail and door fastening will be explained.

NEW TELECOM NETWORKS CREATE MAYHEM FOR INSTALLED EMERGENCY ELEVATOR TELEPHONES

Lars Odlén
SafeLine Europe, Belgium

The on-going changes into VoIP backbones, profoundly affect the way phone-lines transmit signals. Issues are; echo cancellation, voice compression, slot fill, jitter buffers, round trip delay shifts and line current supply, just to mention a few. Installed emergency phones might stop working and this in a whole area, as the telecom shift from analogue to digital technology.

OPTIMIZING MAINTENANCE AND REPAIR – COST REDUCTION BY ADOPTING INTELLIGENT LIFT SYSTEM SENSORS

Tim Ebeling
Henning GmbH, Germany

A new sensor with intelligent evaluation algorithms will allow the wear and tear of essential lift system components to be permanently monitored. This will permit maintenance and repair work to be planned without the need to meet specific intervals and a high level of availability to be achieved with an optimum resource efficiency.

This sustained resource management is made possible by permanently monitoring the lift system and by detecting important parameters such as the wear of guide rails, of motor bearings by means of a frequency analysis, of the door operators, door guides, performance data, ride quality data, acceleration and deceleration behaviour etc. by means of an acceleration and vibration sensor.

The new assessment concept is devised to automatically create forecasts and trends on the basis of the data collected and present them to the user. For the first time it is possible to measure the wear of lift system components and issue appropriate servicing recommendations so that the material no longer needs to be replaced at specific servicing intervals and the use of resources can be adapted to the actual needs.

PASSENGER BATCH ARRIVALS AT ELEVATOR LOBBIES

Sorsa Janne[1], Juha-Matti Kuusinen[2] and Dr. Marja-Liisa Siikonen[3]
[1]Manager – People Flow, KONE Corporation, Finland
[2]R&D Engineer – People Flow, KONE Corporation, Finland
[3]Director – People Flow, KONE Corporation, Finland

A typical assumption in elevator traffic analysis is that passengers arrive at the elevator lobbies individually. A recent study shows that passengers actually arrive in batches whose size depends on the time of day. This article

summarizes the results of this study and proposes batch size distributions for morning and mid-day traffic in office buildings. The batch arrival process is described along its effect on the design of traffic analysis tools. Individual and batch arrivals are compared numerically by both traditional calculations and simulations.

prEN 81-77: LIFTS SUBJECT TO SEISMIC CONDITIONS

Paolo Tattoli
President of UNI - Italian standardization body, Italy

In the “Divine Comedy”, Italian poet Dante Alighieri (1265–1321 AD) states that when a soul from Purgatory rises to Paradise, the Earth crust shakes.

In real life, prEN 81-77 is the European draft standard aimed at drawing the safety rules for the construction and installation of lifts subject to seismic conditions.

The scope of prEN 81-77 (expcted enforcement 2012/2013) is to: reduce casualties and injuries, to avoid entrapments, to avoid damages to the machine, to avoid damages to the environment and to reduce the number of out of order systems.

This presentation highlights prEN 81-77 main aspects and its effects on the lift market.

QUALITY CONTROL OF VERTICAL TRANSPORTATION USING COMMON MOBILE DEVICES

Eleftherios Rousoudis, Lazaros Asvestopoulos and Nikos Spyropoulos
Kleemann, Greece

In this modern age of information and the Internet, mobile devices (smartphones & tablets) have been evolving rapidly in recent years and offer great processing power due to the development of software and the advancement of hardware, as well as due to increased demand from users. Our company’s R&D department has succeeded in integrating this technology with lifts, offering a tool that can test and evaluate the quality of vertical transportation. We are now able to have total quality control over our products as they arrive at the final location of installation while continuous feedback is received, not through the use of specialised equipment, but simply by using mobile devices available to both sector professionals and end users of lifts.

RECENT DEVELOPMENTS OF ELECTRONIC SAFETY GEARS: UCM SOLUTIONS

Marcel Hasenrader and Karl Sturmlechner
Wittur Gmbh, Austria

The development of electronic safety gears has enabled a new generation of "smart" devices, which act quicker and are triggered by different sensors concurrently, thereby realizing redundant safety systems totally independent from lift controller.

Utilising EOS electronic speed governor as a basis, Wittur achieved the first certified UCM A3 system solution available on the market.

Thanks to the computational power on board the EOS, identification of excessive acceleration and activation at low speed can be achieved; different solutions are available and will be presented:

- Solution #1: EOS and BSG-25P safety gear
- Solution #2: EOS and gearless drive brake

RELATIONSHIP BETWEEN ESCALATOR ACCIDENT FREQUENCY AND COMMUTER DENSITY

William Wing-hong Lam[1] and Eric Wai-ming Lee[2]
[1]Corporate Responsibility Development Manager, MTR Corporation, Hong-Kong
[2]Assistant Professor, Hong Kong City University, Hong-Kong

Escalator is popular in public space around the world and, as a facility in built environment, has some characteristics with potential hazards. It has continuously moving parts that exposed to user. It demands users to exercise judgment to synchronize their movement with the escalator when stepping on to and off it. The behaviors of some users have implications to safety of other users.

This paper attempts to explore the correlation between the commuting pattern of crowd movement and escalator safety. In this study, a consistent pattern of a narrow peak of accident frequency occurs at certain utilization rate on escalator. The pattern also indicates that the accident frequency drops significantly when the utilization rate reaches certain level. The findings suggest development of operational measure to improve escalator safety with reference to the utilization rate on escalator. It also suggests the further research direction regarding the modes of accidents associated with the utilization rate; building a model to correlate the factors of the public space and the escalator density and the accident frequency.

REMOTE MONITORING AND SUPERVISION SYSTEM FOR LIFTING EQUIPMENT OVER TCP/IP NETWORKS

André Guerra
Liftech, Special Projects, Portugal

The Portuguese national railway company owns several hundreds of lifting equipment, including lifts, escalators and conveyors, representing over 20 different models from different manufacturers.
It was identified the advantage of having a better knowledge of the overtime performance of these equipment (working time, failures, time in maintenance, etc.), to make available an online status of each one (events, alarms, etc.); to control the performance of the maintenance personnel (response time, repairing time, etc.); finally to be able to remotely put some equipment out of service.
In this context, it is presented a system that was developed to comply with these requirements, that is able to handle equipment from any manufacturer. It is composed of an acquisition part – collects information from equipment, a processing unit – processes information and places it over a TCP/IP network, and software – for visualization of the information and reports.

STATION CAPACITY AND VERTICAL MOVEMENT IN METRO STATIONS

Philip Chan-man Leung[1] and Eric Wai-ming Lee[2]
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A typical metro station can handle more than 300,000 passengers per day, but what is the Maximum Practical Capacity of a station at any specific time is very often an arbitrary term for both designers and operators. Vertical movement plays an important role in passenger flow of Metro stations. Vertical facilities, such as escalators, staircases, and lifts, form the main channel for transporting passengers between the Concourse Level and the Platform Level. Many previous studies were merely focused on the relationship between speed, density and flow. Little attentions were paid to evaluating the provision of vertical facilities of stations in a comprehensive way. This study gets started with a summary of passenger flow characteristics in metro stations in Hong Kong, followed by a close look at vertical movement for normal stations with high patronage, cross-boundary stations and stations with passenger control, respectively. It is found that a couple of factors, including arrival process, standing patterns, the distance between escalators and automatic fare collection gates and maximum escalator throughput, substantially affect the utilization of vertical facilities and all the handling capacity of a station. The article go further by presenting real cases,

illustrating the way to identifying the cause of congestion and providing solutions from a point of view of both engineering and management.

THE FUTURE CITY - A STUDY ABOUT URBAN DEVELOPMENT AND FUTURE TRANSPORTATION NEEDS

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The following trend analysis has been established in collaboration with universities, investors, general contractors and freelancers. The report allows a glimpse into the future and tries to explain role-models of future cities and transportation media. Since there are many aspects and influence factors involved, we have tried to merge, bundle and simplify the majortopics of urban mobility. The main focus has been given on various trends related to people and their behavior, like mobility, communication, energy, supply management. This paper will explain how the fact that future cities growth in height will impact the elevator industry and the way people and goods will be transported.

THE INSPECTION OF THE 1010M/MIN. ELEVATORS IN TAIPEI 101 IN 7 YEARS AFTER OPERATION

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We have the policy of safety, easiness and riding comfort. The Guiness World Record 1010m/min. elevator in Taipei 101 was proved to achieve the highly goal of this goal resulted in achieving the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Platinum certification. We adopted the World No.1 highly technology to the elevator, such as an atmospheric-pressure control device etc. We reconfirmed to sustain high performance through the comprehensible inspection. But, why having this sustainability? You may be impressed the solution in this paper.

THE REVOLUTIONARY FUTURE OF ELEVATOR TECHNOLOGY IN NORTH AMERICA

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Will the Performance-Based Code revolutionize existing Prescriptive Codes and the Authorities Having Jurisdiction (AHJ) concept? Since January 1921, when the first edition of A17.1 was published by the American Society of

Mechanical Engineers (ASME), the elevator industry has subscribed to a Prescriptive Code for new and existing elevator installations. The recent introduction of a Performance-Based Code (PBC) has generated lively debate about relationships between elevator contractors and AHJs during the product approval and permitting process, final certification process, and annual certification of installed units. This paper describes differences in these Codes and their potential impact on the future of North American elevator technology.

THE STREET CALLED "ASANSOR" AND WATER-POWERED ELEVATOR INSTALLATION IN IZMIR

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Asansor (which means elevator in Turkish) is a 1907 built building in Izmir's Karatas quarter, within the boundaries of the metropolitan district of Konak. The old Asansor quarter, filled with old restored houses is also known as the Jewish quarter Dario Moreno Sokagi at the main pedestrian street to the Asansor itself, which is an elevator that was built in the 19th century. At fifty-one meters in height it provides access between the lower and upper streets situated on the upper side. It was built as a work of public service by a wealthy Jewish banker and trader of its epoch, Nesim Levi, in order to ease a passage of 155 steps, from the narrow coastline of Karatas to the hillside approximately 58 meters height, the elevator within the building serving to carry people and goods through the steep cliff between the two parts of the quarter. The street was renamed 'Dario Moreno' Street in memory of the singer. There was one water-powered elevator installations. Electrical drive machine replaced the hydraulic-powered elevator. This paper briefly presents some aspects of this old fashion elevator system and also the early applications for this type of water-powered elevators.

TRAFFIC VARIATIONS AND HOW THEY IMPACT ELEVATOR PERFORMANCE

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Abstract: Performance variation is inherent to elevator dispatching because one of the key inputs to dispatching analysis, the relevant traffic, varies day to day and hour to hour. This paper discusses the effect of that variation on elevator performance metrics and attempts to compare results of different dispatching algorithms. This paper also discusses the concept of elevator handling capacity and reviews the difference between steady handling capacity and peak handling capacity.

TRENDS IN SAFETY CODES AND STANDARDS FOR ELEVATORS AND ESCALATORS

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KONE Corporation, The Netherlands

The elevator industry is facing important opportunities but also several challenges!

High rate of urbanization, demographic changes and need for accessibility to buildings is increasing the demand for elevators, especially in the high growth and emerging economies. As a result, there is a pressing need for a worldwide approach to address safety and accessibility.

To ensure a uniform high level of safety significant harmonization of safety codes and standards around the world is necessary.

Innovations are indispensible means of improving safety, efficiency and accessibility of the products. Timely and safe implementation of innovative solutions requires a different approach to the safety codes.

Environmental issues are another focus for the industry which also requires a worldwide view and approach.

There are many planned and on-going activities within the international standardization organizations to address those challenges. This paper provides an overview of those standardization activities.

TWO ELEVATOR "FIRSTS"

Dr. Lee E. Gray
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This paper explores – through the means of computer generated 3D images – two pioneering elevator systems. The first is the Teagle (1804), which was employed in British textile mills and represents one of the first fully mechanized elevator systems. The second is Otis Tufts' Vertical Railway Elevator (1860), which was one of the first elevator systems specifically designed to carry passengers. The images created for this paper permit, for the first time, a thorough understanding of how these early elevators operated and – particularly in the case of the Vertical Railway Elevator – reveals the incredible inventive skill and imagination of their designers.