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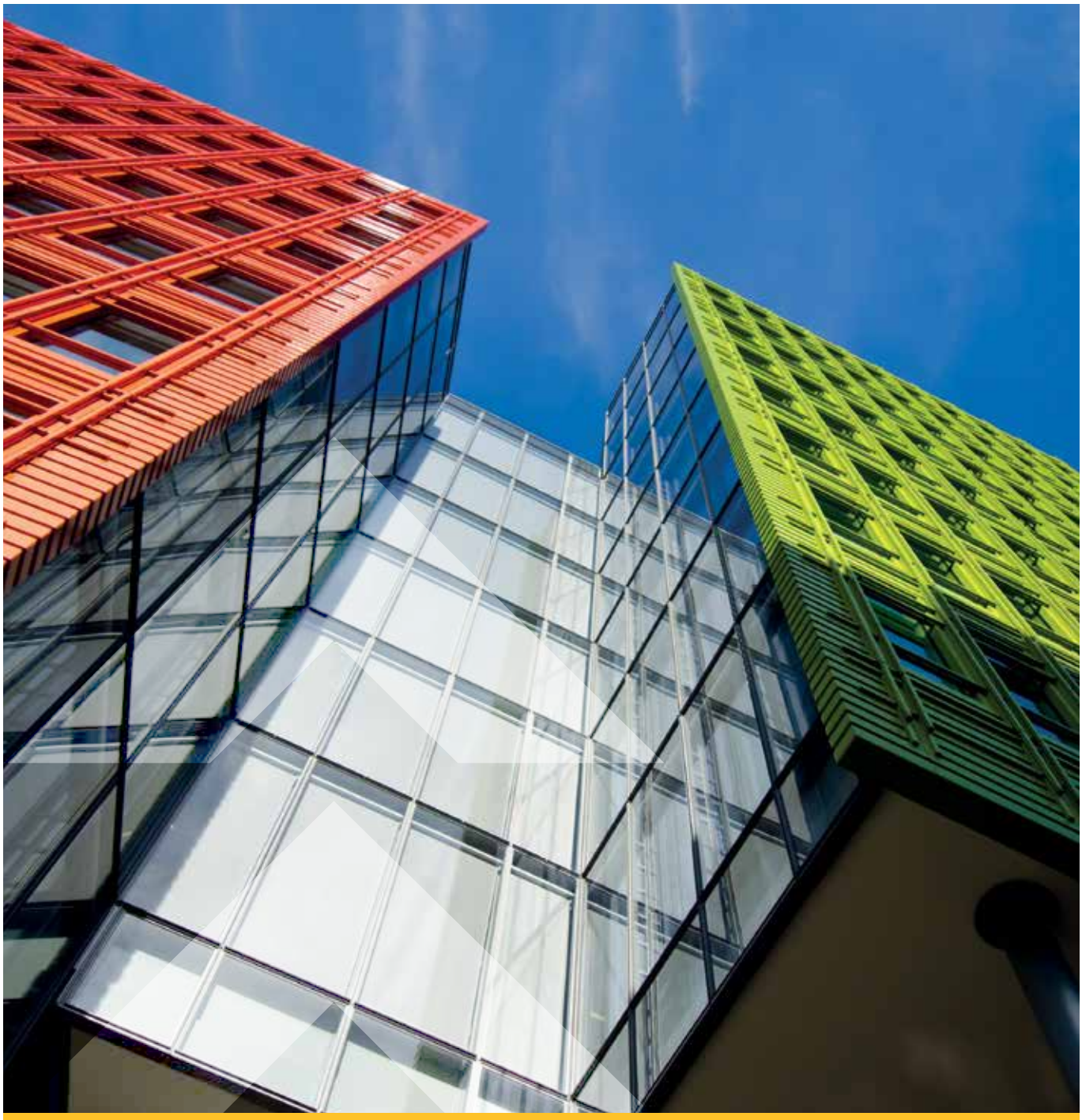
A UK-BASED MAGAZINE WITH A GLOBAL OUTLOOK FOR THE LIFT AND ESCALATOR INDUSTRY



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RUTH CARTER OVERVIEW

Welcome to the Spring edition of Lift Industry News

It is a great pleasure to be asked to be the Guest Editor for the fourth edition of Lift Industry News, especially given its focus on environmental issues.

When I took on the role of Chief Executive at CIBSE, the Chartered Institution of Building Services Engineers, back in 2021, I was enthusiastic about how CIBSE can lead delivery of the safe, net-zero carbon buildings required to meet new carbon emissions targets and building safety act regime and, create buildings that perform.

In an opinion piece I wrote for futurebuild I said the 2020s have been termed 'the Decisive Decade' for mitigating the effects of climate, biodiversity and equity crises. In working with some of the most brilliant minds in building services engineering, I get to witness first-hand the skill and determination they put towards solving these imperative challenges.

CIBSE is, of course, an obvious and welcoming home for lift engineers who play vital roles ranging from designing lift systems in buildings through to installation and maintenance of those systems.

The Lift Industry is clearly putting their ingenuity and determination into their Environmental Social Governance (ESG) responsibilities. You can read about Jackson (Page 42), the Dewhurst Group (Page 48) and an energy intelligent solution for lifts at Global1Partners on page 28. There are so many stories of excellence in tackling our climate responsibilities in this industry, let us all keep on doing even better. CIBSE has been active for many years in authoring and promoting guidance, policies and measures to mitigate climate change, to adapt our buildings to the changing climate and to establish the critical link between how buildings perform in operation and their carbon impact. We are leading by example in our search for a new Head Office - you can read more in CIBSE News on page 45.

We celebrated 125 years in 2022 and we have all seen huge changes in our industry over those 125 years. We didn't call it ESG but the work of CIBSE and organisations involved in the lifts and building services industries have always focused on sustainability, health and safety.

In his role as Technical Director and Sustainability Manager at Schindler, Paul Turner talks about the core values of ESG running through everything the company does on Page 36. Paul is also the new President of LEIA and has taken responsibility for creating a more sustainable organisation.

I mentioned brilliant minds earlier and in the Knowledge Bank on Page 53 there are three fascinating papers to read, setting out how our industry can respond and play our part in addressing the green aspects of our business.

At CIBSE we are delighted to have the Lifts Group who are one of the most active groups within the Institution. The phenomenal effort put in by members of that group resulted in Guide D - Transportation Systems in Buildings, which is one of our most read publications. I cannot sign off without mentioning Dr Gina Barney and to thank her for the years of effort she has put into driving the Guide forward.

A number of Lift Group members have been awarded honours from the Institution over the years including Gina who was made an Honorary Fellow in 2014 and received a President's Commendation in 2021 for her work on publications associated with emerging from lockdown. Richard Peters, Elizabeth Evans and Rory Smith were awarded the Carter Bronze Medal in 2012 and Dave Cooper was awarded the Silver Medal in 2013 and also the President's Commendation in 2021. Dave Cooper is also an incoming Vice President at CIBSE having served on the main board for 3 years.

It can be seen that the vertical transportation community are close to our hearts at CIBSE and it was therefore with great pleasure that I accepted the invitation to be this edition's guest editor.

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THIS QUARTER

We are going green this quarter with articles about energy efficiency in many forms

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CALENDAR 2023

May 12 - 14 Fri to Sun

Lift Expo Morocco
May 12-14

CASABLANCA, MOROCCO

August 22 - 24 Tues to Thurs

Global Lift & Escalator Africa
August 22-24

JOHANNESBURG, SOUTH AFRICA

October 17 - 20 Tues to Fri

Interlift
October 17-20

AUGSBURG, GERMANY

May 23 - 25 Tues to Thurs

ExpoElevador
May 23-25

SÃO PAULO, BRAZIL

September 04 - 07 Mon to Thurs

Lift City Expo Jeddah
Sept 4-7

JEDDAH, KSA

November 15 - 17 Weds to Fri

Global Elevator Exhibition
November 15-17

MILAN, ITALY

June 20 - 22 Tues to Thurs

Elevcon
June 20-22

PRAGUE, CZECH REPUBLIC

September 20 - 21 Weds to Thurs

Lift & Escalator Technologies Symposium
September 20-21

NORTHAMPTON, UK

November 21 - 22 Tues to Weds

LiftEx 2023
November 21-22

LIVERPOOL, UK

July 05 - 08 Weds to Sat

World Elevator & Escalator Expo
July 5-8

SHANGHAI, CHINA

October 16 - 20 Mon to Fri

CTBUH International Conference 2023
October 16-20

SINGAPORE

December 05 - 07 Tues to Thurs

International Sourcing Exposition for Elevators and Escalators
December 5-7

MUMBAI, INDIA

/2024

December 05 - 06 Tues to Weds

International Elevator & Escalator Symposium

December 5-6

EDINBURGH, SCOTLAND, UK

May 09 - 11 Thurs to Sat

Inelex

May 9-11

IZMIR, TURKEY

September 16 - 18 Mon to Weds

The Elevator Show

September 16-18

DUBAI, UAE

October 01 - 02 Tues to Weds

E2 Forum

October 1-2

FRANKFURT, GERMANY

December 04 - 06 Mon to Weds

Lift Expo Italia

December 4-6

MILAN, ITALY

COUNTDOWN TO THE 14TH SYMPOSIUM

The 14th Symposium will take place on 20-21 September 2023 at the Hilton Hotel, Northampton, UK.

It brings together experts from the field of vertical transportation, offering opportunities for speakers to present peer reviewed papers on the subject of their research. Speakers include industry experts, academics and post graduate students.

Register now for an early bird discount until the end of June. ***https://www.liftsymposium.org***

CTBUH INTERNATIONAL CONFERENCE

The Council on Tall Buildings and Urban Habitat (CTBUH) is being held in Singapore & Kuala Lumpur, 16-20 October 2023. With the United Nations projecting nearly 70 percent urbanisation by 2050, we need to ensure that cities are places where people can not only live—but thrive. Transportation, public and cultural institutions, open space, commercial entities, and other integral infrastructure need to be considered holistically and adapted broadly and equitably for positive, sustainable outcomes. Accordingly, tall buildings need to be woven into the urban fabric like never before.

TRANSPORTATION SYSTEMS IN BUILDINGS:

University of Northampton

Open-access Online Journal for Dissemination of Research and Innovation in Lift and Escalator Technologies

BACKGROUND

This is an update about our past and more recent activities and developments in research and innovation to generate new knowledge in the area of lift / escalator and related technologies. In 2011 the University of Northampton, the Chartered Institution of Building Services Engineers (CIBSE) Lifts Group and the Lift and Escalator Industry Association (LEIA) started a conference series, the annual Symposium on Lift and Escalator Technologies. This international conference, together with associated events and activities, is managed by The Lift and Escalator Symposium Educational Trust. The aim is to advance research, innovation and education in lifts and escalator and related technologies. The conference is currently in its 14th edition and has grown to become an important discussion forum which every year brings together over 130 industrial and academic experts from within the field of vertical transportation engineering. The symposium papers are published in the conference proceedings, which are indexed in Elsevier's Scopus, the largest abstract and citation database of peer-reviewed technical literature. The papers are also available on-line on the resources pages of the symposium website.

TSIB JOURNAL AND CALL FOR PAPERS

Extended papers presented at the Symposium and new research papers on the subjects balancing the theoretical advances and practical new technologies and techniques in the area of transportation systems in built environment and associated areas can be submitted for publication in our open-access peer-reviewed journal Transportation Systems in Buildings (TSIB) which is edited jointly by the University of Northampton, CIBSE Lifts Group and LEIA. The third issue of the journal has recently been released and is available online (please see the Table of Contents).

The journal is aimed at providing a periodical publication platform for disseminating and for the facilitating awareness of new technologies covering the latest cutting-edge transportation technologies in buildings and associated areas. The scope of the journal covers a broad range of scientific areas with an emphasis on rigorous theoretical treatment and advanced practical techniques. All papers submitted to the the Journal undergo a scholarly double blind peer review process. Upon publication the papers are free to be downloaded in perpetuity.

We are currently inviting authors to submit paper manuscripts for publication in the next issue of TSIB. Holistic papers that integrate research, practice and learning, bridging the gap between those three elements, will be especially welcome. Papers for the annual issues of the journal can be submitted round the year. If you wish to submit a manuscript please contact the Editor and / or visit the TSIB webpages and go to the Information For Authors page.

TSIB EDITOR AND MANAGER

Stefan Kaczmarczyk
University of Northampton
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http://journals.northampton.ac.uk/index.php/tsib/about/editorialTeam

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CIBSE Lifts Group

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How confident are you that the lift system you designed is working properly?

POINT OF VIEW

With many hours spent on the design process and numerous traffic studies carried out, how confident are you that the recently completed lifts in that major new development are working at their optimum levels of performance?

You've assessed the client needs, considered the future-proofing requirements and tested the proposals with the market. Your design work is finalised and put forward as the optimum VT solution. VT contractors may then carry out traffic studies to confirm the design, making assumptions about lift performance, door speeds, acceleration rates, start time delay, dwell times and more – variable criteria used in the simulation, from which results are derived.

Bearing all this in mind, come the day of handover, how confident are you that what has been installed is adjusted to align with the traffic study criteria and capable of delivering the service expected?

Raise this question at the commissioning stage, and as building completion approaches, and you may not be surprised to learn that often the answer is, "Not very". The set-up criteria is often left to the individual tester's judgement with little, if any, reference to the original design requirements and as such there is no closing of the circle between design and application.

Is there a procedure for testing?

Aside from the issues of individual lifts, if you enquire as to how the group operating parameters are verified, you may well be told that the group software has been set in the factory and engineered to suit your project. Ask how this is checked on site and you are unlikely to get a reassuring response. This raises the suspicion that there is no formal procedure for the group operational testing, with the contractor relying on a 'plug and play' approach based on the assumption that the software has been correctly engineered and applied.

This begs the question; what criteria is initially used to set up individual lifts and how can this be verified? Any group is only as good as the sum of its parts, so a good starting point is a comprehensive 'performance test' of each lift. This checks everything from the car light switch to door opening and closing times, performance times, door closing forces, door detector operation and load weighing functions, among others. This process quickly throws up issues that, once addressed, ensure a level of operational consistency for all lifts in the group. Where applicable, the key performance criteria should align with the traffic simulation inputs, which in turn means the simulation performance criteria needs to be realistic in the first instance.

As part of the performance tests, the checking of the landing call stations and indicators is an important part of the process and can in itself throw up plenty of issues.

It has to be said that performance tests are not just applicable to groups of lifts but prove beneficial for all lifts - it is amazing what you find when going through this process. I have to say, it is highly recommended.

Further testing

Having ensured each lift is working at its optimum level, group operation and functions are next to be considered. You may recall a historic defined systematic method of 'grouping' lifts which followed a precise process to ensure the group operated as designed and provided the best service the system could deliver.

Today this isn't quite so simple given the complexities of modern group control systems, but a form of 'simulation testing' can be employed to verify the group is working to its optimum. Again, time and effort are required, but from experience it is an exercise well worth undertaking. A prerequisite is that all lifts in the group are completed, performance tested and are operating at the required level.

Using the two key reference points for group performance, the morning up peak and lunchtime two-way traffic, it is possible to simulate both modes of operation with fully functioning lifts. Real time testing brings challenges, but it does provide a high degree of assurance that the lifts are working correctly and that what has been designed will provide the service levels predicted.

It has to be recognised that the tests are measuring the performance against the applied design criteria and not the actual building usage levels or patterns. As such, the tests are seeking to verify that the group can deliver the predicted levels of service in a working environment, as opposed to theoretical.

For destination systems, the format of the test is to input landing calls via a laptop which simulates passengers placing destination calls. The demand profile mirrors that of the original simulation criteria in terms of incoming, outgoing and inter-floor traffic levels for both tests.

For the up peak tests, the level of call input can be made incremental and represent a 'stepped profile' traffic simulation. Each step increases the input of calls by 1% and runs for a predetermined time, sufficiently long enough to ensure the demand can be satisfied. With an up peak handling capacity of 12%, the tests typically start at 9% or 10% and rise to 14% or 15%, or the point at which the system finally saturates. The saturation point is the key to understanding the group's capability and capacity.

Similar tests can be undertaken for two-way lunchtime traffic and the results from both tests can be assessed against the original design results to see if the lifts are indeed delivering the performance anticipated.

The situation is a little different for conventional control systems and although I haven't experienced a simulation test of this type, it is quite possible to envisage its feasibility with car calls being registered as opposed to landing destination calls.

The one big issue with any group simulation test is the thorny question of car loading criteria. We know that currently an 80% car loading factor is used in traffic simulations, while in reality the number of people allocated to a car for destination systems is less; another debate. However, given the tests are premised on the design criteria of an 80% load, then this is what should be simulated.

A further test which reflects a 'realistic' level of car loading can also be carried out and the results assessed, as these will be nearer to the actual capacity of the system. There are compromises to be made in the simulation testing process and while it isn't an exact science, it does provide an opportunity to test the group control system in a more realistic environment, which should provide the necessary assurance that the systems are correctly configured and operating at an optimal level.

From the VT contractor's standpoint, the tests offer a valuable opportunity to assess their design simulation software against actual performance and hopefully allow them to refine their algorithms to reflect what can realistically be delivered. It should also be hoped it will drive a process to ensure individual lifts are adjusted on site to the parameters used in the design process.

Achieving ongoing success

With the rigours of simulation testing behind you, the key to ongoing success is maintaining good levels of maintenance from a team of service engineers who are fully trained and well acquainted with the equipment and its working environment. We are all acutely aware of the skills issues our industry faces but there does appear to be a lack of understanding at the service engineer level of how groups actually work. This appears to be compounded by a reluctance to provide the local team with too much information for fear of their making changes that fundamentally disrupt the whole system. As such, the access levels to adjustable parameters are restricted meaning reference is often made back to the engineering centre when issues arise or software changes are needed.

This raises the wider question of training and how well complex group control systems are understood by clients, consultants and service providers? Perhaps a question best left for another day.

I would like to acknowledge, with thanks, Dr. Richard Peters, Dr. Jonathon Beebe and Alan Cronin when discussing this subject.

BIOGRAPHY

Len Halsey spent a major part of his career with Otis, holding senior technical and managerial positions, before joining Canary Wharf Contractors in 1998. He was appointed Project Executive for Vertical Transportation Systems in 2002 responsible for VT design across the range of developments undertaken by Canary Wharf including, office, residential, retail and infrastructure projects. He retired from Canary Wharf Contractors in 2019 and is now retained by the company as a consultant. He is a member of CIBSE and a former chair of the CIBSE Lift Group.

FROM THE ARCHIVES

It all started in 1961

Call Allocation Destination Control (DC) is not Adaptive Call Allocation (ACA)

We asked Gina Barney to take a look back into her library and choose something from the archives of interest to our readers today.

For this "From the archives" we go back 62 years or so. This is to look at the idea of engineer Leo Port to put the passenger destination buttons on the landing and not in the lift car.

The article is in two parts:

Part 1
The people who made it happen.

Part 2
How Call Allocation works – theory and practice.

Part 1 is presented here, and **Part 2** will be in LIN Issue 5 in the Summer.

Figure 7.47 CIBSE Guide D: 2020 Schindler Ltd

Port was the first person to propose in 1961, what is now universally accepted – to take the destination pushbuttons out of the car and put them in the hallway/lobby/foyer/ landing. It was the first proposal for Call Allocation, which Closs (1970) termed it. Port patented it as PORT–El in 1961, which he let expire in 1977. See page 20 for a biography of Leo Port (private correspondence).

He had two implementations, one in the Law School at the University of Sydney and the other was in the Australian Milk Marketing Board offices. Both installations were low rise and only had two or three lifts. Port did not have enough computing power using relays, so he programmed the lifts to always go to the same floors using simple fixed logic.

EPL-Kone, the maintainer writing in June 1989 remarked, (private correspondence):
"Both systems have been in operation since the early 1970s and require a large amount of maintenance time as they are relay systems and the number of relays necessary to do the job is quite staggering. The application of microprocessors will no doubt make this type of system technically feasible.

Our experience is the system is not "user friendly" and its benefits in a building where visitor rates are high is doubtful. People take time to understand the system and visitors find it hard to use. The Milk Board are seeking funding to replace them with a traditional system."

Port was a man before his time and struggled to implement very complicated logic systems using relays. The remark "Staggering number of relays" supports this comment. We all know how tricky it is to keep relay systems running. In 1989 microprocessors were available and Port would have been in his element.

Passengers did not like the system. Much of the problems of acceptance would have been associated with the passenger interface. DTMF "Touch Tone" keypads only became available in 1963 – many passengers would be unfamiliar with keypads. Also the signalling systems of the 1960s could well be incandescent bulbs or neon lamps.

MICHAEL GODWIN

In or about August 1968, Michael Godwin, then Research Director of Wadsworth Lifts, Bolton suggested to me that the passenger destination call buttons should be on the landing having noted Port's idea.

Mike was and is a very innovative and intuitive practical engineer. In his early life he was a technician to Donald Campbell's water speed record attempts. In 1967 he joined Wadsworth Lifts as Research Manager. In 1971 he formed Lift Design Partnership with Dr Barney and developed a uniform specification for public housing lifts. In the 1970s he developed data logging systems for BRE. His most significant project was the modernisation of the lifts in Bush House, London (then home of the BBC's overseas services) in the 1980s. These lifts displayed to the passenger on the landing the expected waiting time. Retired to Nice in 1990.

DAVID CLOSS

David Closs became my PhD student in 1968 to research Call Allocation. He analysed the optimum way a lift should answer its car and landing calls. He concluded this to be answering all car calls in a forward direction to car reversal and answering landing calls in a reverse direction until the last had been served, but answering car calls as they were registered in that direction. He concluded a lift should not reverse direction or pass a car call while passengers were in a lift car. He graduated in 1970.

Leaving school in 1958 David Closs followed an apprenticeship at English Electric and was awarded a HND and became a Grad IEE in 1962. He worked as an Engineer at EE until he went in 1965 to Lebanon to teach. In 1967 he joined the Control Systems Centre, University of Manchester being awarded an MSc in 1968 and a PhD in 1970 under the supervision of Dr Barney. He did not continue researching lift systems, but joined the Electrical Engineering Department at UMIST as a research fellow.

SERGIO DOS SANTOS

In May 1972 Sergio dos Santos became my MSc student with the task of creating an interactive simulation suite of programs. He produced the basic suite to be known as Lift Simulation and Design (LSD) and later as PC-LSD for personal computers.
Dos Santos then undertook further work for a PhD, graduating in 1974. His work analysed a number of existing traffic control systems and looked at call allocation systems in depth.

In 1977 dos Santos and I published the book *Lift Traffic Analysis Design and Control*, which included a detailed description of adaptive hall call allocation (ACA). The description included choice of cost functions, penalty functions, dynamic subzoning and adaption to traffic conditions. These will be explained in Part 2.

The basic system works by the algorithm allocating each new passenger call, as it is registered, to each car in turn and evaluating the cost of each allocation. The allocation giving the lowest cost is then adopted. Suitable cost functions are, for example, passenger average waiting time, passenger average journey time or a combination of both.

An attempt was made by a Japanese company in 1978, when the Port-El patent expired and was not renewed, to patent the Call Allocation principles. They failed owing to the prior publication by Closs (1970) and Dos Santos (1974) in their PhD theses and the publication of a detailed description in the Barney and Dos Santos book in 1977, ie: prior art. Thus, Call Allocation systems were free to use in the public domain by any lift company!

Professor Dos Santos arrived in Manchester in 1971 from the University of Lorenzo Marques, Mozambique, when it gained independence. He became Dr Barney's MSc and PhD student in 1972. He programmed the first interactive lift simulation suite of programs Lift System Design (LSD) in 1972 and went on to use it as powerful research tool. He and Dr Barney published the classical Round Trip Time equation in 1975 and later the design of the Call Allocation traffic control system in 1977. He returned to Portugal and the Universidade do Minho in Braga in 1975 as a lecturer and retired as Rector (Vice Chancellor). Lives in Braga.

DR JORIS SCHROEDER

In 1990 Joris Schroeder of Schindler reported at Elevcon 90 in Rome on a partial implementation of Call Allocation to be known as Schindler M10. He used the specification in the Barney & Dos Santos 1977 book, which he acknowledged in the presentation.

He had struggled to get the project accepted internally at Schindler, but he successfully converted the Ebikon offices over the Xmas1988 /New Year 1989 for traditional to call allocation. This was successful, but many in the industry said the idea would not work. How wrong they were as by 2020 everyone was using Call Allocation - many badly and inappropriately.

I visited Joris in Switzerland during 1990 and asked him why he had not implemented all the call allocation features.

He said he did not have the time and that I should do it. He sadly died a few years later which might explain why.

Contrary to what search engines suggest Dr Schroeder did not invent Call Allocation – Leo Port did. Joris had the tools the idea from Port, the theory from Barney and Dos Santos and the strength to implement despite all odds.
"...such a system needed an IBM computer" Leo Port

See Part 2 in the next issue to see if it did.

Dr Schroder was a graduate of Stuttgart Technical University and received a PhD from the Berlin Technical University having developed the formula for the highest reversal floor (H). He held the positions of Vice President with Otis in Germany and USA. In 1977 he left Otis and joined Schinder in Switzerland. He implemented a basic Call Allocation traffic control system on a three car group according to the specification in Barney and Dos Santos in 1988-9. He achnowledged this in his presentation in Rome in 1990. He passed away in the early 1990s.

LEO PORT BIOGRAPHY

The Lift Manufacturer Association of Australia in June 1989 offered the following summary: "Leo Port was a consulting engineer partner of Donohue and Carter, McAskill, Port and Warner in Sydney, Australia. He was the son of immigrants originally named Rappaport from Europe who fled the Nazi persecutions of Jewish communities in the late 1930s. He graduated from the University of Sydney in electrical engineering. He had many interests including a strong involvement in civic affairs and became Lord Mayor of the city of Sydney in September 1975. He died in office following a massive heart attack in August 1978.

"He designed the "Port-El" traffic control system and was granted an Australian Patent 255218 (I have copy) in 1961, which he did not renew, and it expired in 1977.

"Leo was a very vigorous individual who had definite views on most things including his ability to revolutionise "elevatoring". At a social level he was a most attractive and cultured personality and great fun to be with.

"He attempted to interest many parties in his system, including most of the elevator companies in Australia, and eventually was able to introduce the system into two buildings: the University of Sydney Law School and the State of New South Wales Milk Board in Regent Street, Sydney. Both buildings were single tenancies with a student facility in one and civil servant in the other. The buildings were low rise, three floors, and with only two lifts.

"Elevators Pty Ltd (Kone) undertook the projects and their R&D people worked with Leo on refining the control system etc. as an alternative to a conventional despatching system of that era mid to late 60s.

"Apparently one of the problems at that time was the available state of relay logic and the multiplicity of such devices needed for the elevator functions. Interestingly enough Leo apparently stated that such a system needed an "IBM Computer" to enable it to perform its functions more satisfactory. Today {1989}, of course such logic control is available or could be. At that time an appropriate computer would have overwhelmed the machine rooms due to its sheer mass.

"One of the critical factors apparently was an absolute need to convey information to intending and travelling passengers. A great deal of time and money went into the signs, indicators, etc. and these wre constantly being modified at Leo's insistence for some time after handover. Likewise load weighing in the cars was judged to be critical to the system to enable it to ascertain if it had the capacity to pick up and despatch efficiently.

"The installed systems worked and continue to do so (1989) under the service of EPL-Kone and remain substantially as Leo left them.

"There was industry gossip that Express Lifts were going to install one in England, but never did due to the cost and complexity. The two projects were of an experimental nature and these always have cost overruns.

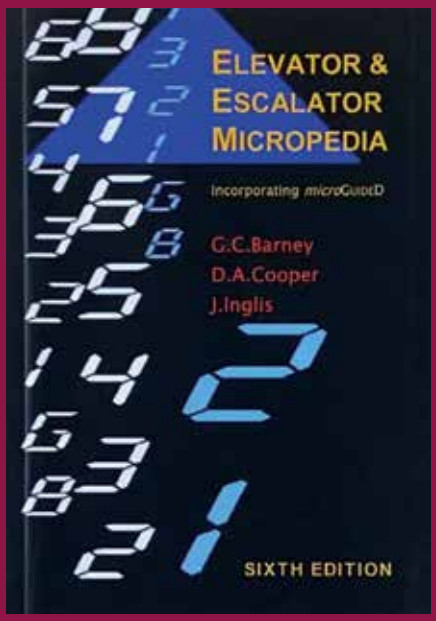
"Leo pushed hard to get other clients to take up the system with no success. He probably lost interest in the matter and became more involved in his civic duties."

DR GINA BARNEY PhD, MSc, BSC, CEng, FIEE, HonFCIBSE

Gina Barney is well known to the world-wide lift industry, owing to her many activities in the field. She is Principal of Gina Barney Associates, Honorary English Editor of Elevatori, Member of the Chartered Institution of Building Services Engineers (CIBSE) Lifts Group Committee, Member of the British Standards Institution (BSI) MHE/4 Lift Committees, UK expert to two International Standards Organisation TC178/WG6 Traffic design and WG10 Energy efficiency of lifts and escalators.

Gina is the author of over 100 papers and is the author, co-author or editor of over 20 books (not all on lifts). Her main activities are technical writing of standards (she is a member of the Society of Authors). She has been Technical Editor of five editions of CIBSE Guide D Transportation systems in buildings 2000-2020. She is also a Member of the Academy of Experts and a Liveryman of the Worshipful Company of Engineers.

ELEVATOR & ESCALATOR MICROPEDIA



The Elevator & Escalator Micropedia is a compendium of useful data providing a handy first "port of call" for information. It comprises: a glossary of over 2150 terms; drawings of lift components; tables & formulae and a "microGuideD" referencing CIBSE Guide D 'Transportation systems in buildings'.

The book has been complied by industry experts from authoritative sources across the world. It will be of practical use to designers, field service personnel, installers and engineer surveyors.

Also, building owners, facilities managers, lift operators, teachers, researchers, students, etc. will find it a helpful reference book.

This edition has been extensively revised to cover the advent of EN 81- 20 / 50 and the emergence of the ISO 8100 family of standards.

Copies of the Elevator & Escalator Micropedia can be obtained from

https://www.cibse.org/knowledge-research/knowledge-portal/geem-elevator-escalator-micropedia-6th-edition-soft-cover

Price £12.50, {£11.00 CIBSE Members} (no VAT)

For quantities over 10 units:-

CONTACT »
Dr Barney
(015396 20790)
Knott House,
Sedbergh, LA10 5LU

LEIA WELCOMES MICKY GROVER-WHITE TO THE TEAM

At the start of the year, LEIA welcomed a new member to the team. Micky Grover-White joined as Technical Manager. We chat with him to find out more about his journey in the industry and what his new role will involve.

"I entered the lift trade in 1999 as an Installer, as I was lucky enough to have some friends who had established a small lift company after the closure of Express Lifts. It only started off as one week's work but soon developed (a full eight years in fact!). Many of the lifts we installed were supplied by small UK firms, but the job took me across the UK and even as far as Australia. From there I progressed into sub-contracting in London with some of the larger companies where I was drawn towards testing lifts. After completing my NVQ4 I went to work for Otis where I initially started as a Lift Tester but then moved into technical support.

It was at Otis that I met the late Ian Jones and gelled instantly! He asked me to join the LEIA Quality and Technical Committee which led me to work in standardisation. After Ian's passing, I took on the role of Codes and Standards Manager at Otis.

After six years at Otis, I joined LEIA in January in the new role of Technical Manager. As a member of BSI and CEN committees, I'll continue to work on standardisation and the development of upcoming codes. I'm also supporting Nick Mellor in answering the technical queries we receive on a regular basis.

The first few months have been challenging, but exciting. I've been busy working with the CEN Committee on the development of the evacuation lift standard. This will be welcomed in the UK and I'm really proud to be a part of it. I would like to assist with education and training and focus on lift testing. I would also like to get involved in accessibility standards, an area where there is still much work to be done.

What do you see as the biggest challenges this year?

Fire-related issues will continue to dominate the agenda. The Fire Safety (England) Regulations now make it mandatory for the responsible person in a high-rise residential building to make routine monthly checks of their lifts for use by firefighters and evacuation lifts. Lift companies and Responsible Persons may have some concerns when it comes to getting used to these – which is where we can help. See the LEIA Guidance ***Lift-Escalator-Owner-News-Fire-Safety-England-Regulations-2022.pdf (leia.co.uk)***

- UKCA Marking – lift companies should now be UKCA-marking new lifts in Great Britain (although the UKCA mark may be on accompanying documentation) and, for safety components and machines despite the deadline extension, we advise all lift companies to continue the process of certification by a UK Approved Body.

- Means of escape for people with walking difficulties from multi-floor buildings continue to be a topical issue. The pressure is on to complete work on developing a new evacuation lift standard but until this is published, the evacuation lift defined in BS 9999 is the only one in British Standards that should be used or referenced, see LEIA guidance ***http://www.leia.co.uk/wp-content/uploads/2021/12/Lift-Escalator-Owner-News-Evacuation-lift-standards.pdf***

How can we attract more people to the industry?

Our industry offers so many opportunities. Lifts are everywhere and in every part of the world. Having a qualification in the lift industry literally opens up the world of work. Websites like LEIA's Lift Careers are great for raising awareness of the diverse range of opportunities to be found. Also, apprenticeships are a fantastic way of kick-starting a career in our sector – it's great to see more companies offering these.

And finally, what do you love the most about the industry?

This is a fascinating industry to be in. It isn't just about a box that goes up and down; there are so many parts that make it all function. The speed at which things have changed is simply amazing. Back in 1999 when I started, who knew you would be able to call a lift from a mobile phone? The industry is small enough for everyone to know each other in some way. Although the technology will evolve, we will always need people to install it, regardless of how robots are being used in other sectors.

LEIA APPROVED TO OFFER THIRD APPRENTICESHIP STANDARD

Head of LEIA Assessment, Karen Slade, gives us the update...

We were delighted to announce in February that LEIA Assessment is now approved to offer a third apprenticeship standard, the Level 3 Lifting Equipment Technician. This apprenticeship is for those working across many sectors and organisations using equipment such as hoists for the lifting of lighting rigs at festivals to chain slings on construction sites.

This is a two-year apprenticeship with three methods of assessment used to determine competency during the end-point assessment period.

These methods are:

- Practical assessment with questions.
- Professional discussion underpinned by a portfolio of evidence.
- Multiple choice test.

LEIA will be supported by the Lifting Equipment Engineers Association (LEEA) to develop the assessments over the coming months. It will be available to offer end-point assessment from September onwards.

LEIA Assessment is in full swing delivering EPAs for our core standard, the Lift and Escalator Electromechanic, we feel the time is right to expand our offer to standards that support our sector. The Lifting Equipment Technician is a relevant standard as lifting equipment is often used as part of the installation or repair of lifts, and escalators. We will be working closely with our colleagues at LEEA to develop robust assessments.

Can you help?

LEIA is looking for individuals with technical and operational experience in this sector to work within the development, testing and assessment of this standard, please contact Karen Slade on *epa@leia.co.uk* for more information or visit: *https://www.leia-assessment.co.uk/*

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SAFETY FIRST

THE PASSENGER CONTRIBUTION TO ESCALATOR ACCIDENTS

As many of you will be aware the investigation of escalator accidents is one of my areas of interest. Dr Lutfi Al Sharif, in his paper entitled "Escalator Human Factors: Passenger behavior, accidents & design" [1] created a Venn diagram identifying the three inputs to escalator passenger accidents.

These were:

- Design
- Maintenance, Inspection & Operation
- Passenger Behaviour

The Venn diagram can be seen below (Fig 1) with the section entitled "Passenger Behaviour" highlighted in yellow.

The number of escalator accidents involving personal injury occurring are rising and litigation following accidents is similarly increasing. The works of Gerk [2], Cooper [3], White [4] and Owen [5] indicate this is the case.

When litigation occurs the contribution of all three elements of the Venn diagram will be taken into consideration and escalator owners (the defendants) will want to promote the actions of the passenger as primary causation whereas the claimant (generally the injured party) will want to point towards defects in design and/or maintenance, inspection & operation.

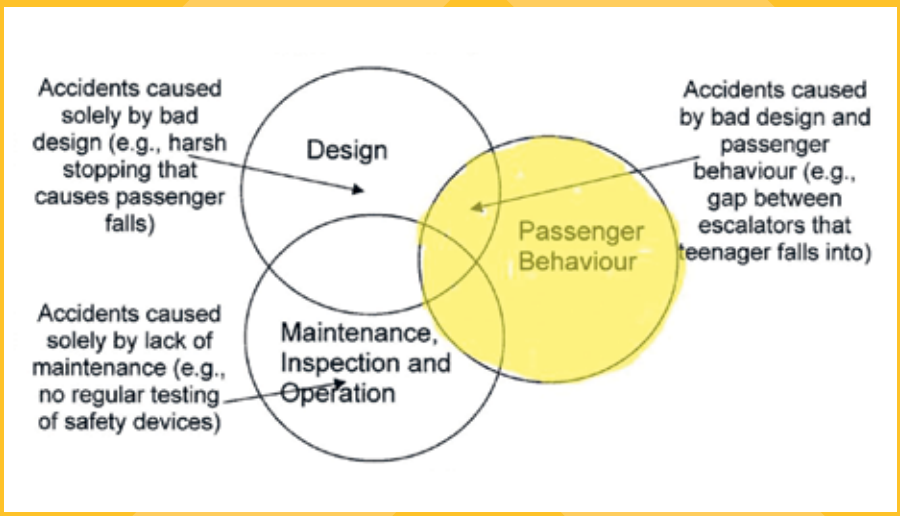

Fig 1: Al Sharif Venn Diagram

Whilst accidents occur that involve a single element of the Venn diagram very often there will be two or three of the elements involved.

My concentration in this edition is to highlight examples of passenger behaviors that contribute to escalator accidents.

In cases where passenger actions have been either causative or contributory to the accident they can generally be categorised as

- Intended Misuse (horseplay)
- Unintended Misuse (lack of awareness)

This categorisation is troublesome as some may argue that a person getting on an escalator with luggage or using a walking stick would not be aware of the potential risk of a runaway suitcase causing a cascade fall or a walking stick tip under load being across the joint between two steps when they go into transition. Many passengers are not aware of the risks at the point of transition of simple actions such as being in contact with a riser at the time.

The troublesome element is when a passenger repeats the same unintentional error and a similar accident occurs where a further risk category can be introduced of willful negligence.

Owners very often rely on CCTV footage when defending legal actions and this can be extremely helpful in any analysis post incident. I include a few photographs showing behaviours that are likely to lead to escalator accidents:

Photo 1: Wheelchair user about to board an escalator

Photo 2: Miscreant youths riding the handrail

Photo 4: Child riding handrail

Photo 5: Youth holding onto handrail external to the step band

Photo 6: Youth sliding down the centre deck

Photo 7: Person struggling with a luggage cart

The passenger input into these events is obvious yet it may be argued that in photo 4 the child was of an age so as not to be aware of the danger he was putting himself in.

Similarly, the lady in photo 7 may well be oblivious to the risk she is placing herself (and indeed others below her on the escalator) in.

I was pleased to be invited to the TKE event at their Hamburg plant in early February where they demonstrated some safety innovations that they were involved with and a separate report appears about this event in this edition of LIN.

The escalator industry will say, and they are right, that the number of accidents compared to the number of journeys is low however the consequences of some of the accidents are life changing and we, as an industry, need to educate and prevent.

I would be pleased to receive photographs and examples of passenger misuse from LIN readers.

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BIOGRAPHY

EurIng Prof. David Cooper BSc (Hons), MSc, MPhil, CEng, FIET, FCIBSE, FSOE, FCGI,

David Cooper is the CEO of UK based lift consultants LECS (UK) Ltd. He has been in the lift & escalator industry since 1980 and is a well-known author and speaker. He holds a Master of Philosophy Degree following a 5-year research project into accidents on escalators, a Master of Science Degree in Lift Engineering as well as a Bachelor of Science Honours degree, Higher National Certificate and a Continuing Education Certificate in lift and escalator engineering.

He is a co-author of "The Elevator & Escalator Micropedia" (1997) and "Elevator & Escalator Accident Investigation & Litigation". (2002 & 2005) as well as being a contributor to a number of other books including five editions of CIBSE Guide D.

He is a regular columnist in trade journals worldwide including Elevation, Elevator World, Elevatori and Lift Industry News. He has presented at a number of industry seminars worldwide including in Thessaloniki, Munich, Shanghai, San Francisco, Melbourne, Zurich, Barcelona and Vienna as well as numerous presentations within the UK.

He is also a Founding Trustee and Chairman of the UK's Lift Industry Charity which assists industry members and/or their families after an accident at work. In 2012 David was awarded the silver medal by CIBSE for services to the Institution. David also Chairs the Charity that runs the Lift Symposium and is an Honorary Visiting Professor at The University of Northampton.

He also sits on the Board of CIBSE. In 2021 he was awarded the Sir Moir Lockhead Award by the SOE for 30 years dedication to safety in the lift & escalator industry.

THE INTERVIEW

Global1Partners Ltd is a leading supplier of a wide range of equipment and components for the lift industry. Having offered trusted solutions since 1993, they pride themselves on adapting and evolving with the market. We chatted with Joint General Manager, Andy Cresswell about Global1Partners' vision and direction as well as an exciting lift energy recovery product they offer, Green Gem.

Give us a little background to Global1Partners – what exactly do you do?

We offer expert solutions and products to the lift industry, working with our partner companies FERMATOR and SICOR to offer the very best in door and machine solutions as well as a broad range of small components. Our strength is best reflected through our local engineering and commercial teams who build long term relationships.

We aim to be more than just a supplier, always acutely aware that our customers have a choice, so we strive to cultivate a partnership to give them peace of mind. It's crucial that we listen to our customers' requirements and respond to the ever-changing needs of the market.

Customers are clearly at the heart of Global1Partners' vision – can you tell me more about that vision and how you put it into practice?

Our values and vision guide everything we do, from the products we sell to the way we interact with our customers and each other. Our values include integrity, innovation, teamwork and, of course, customer focus. Our vision is to be an industry leader in lift equipment solutions, providing the most advanced and reliable products on the market. This is not just a goal to strive for - it informs every decision we make and every action we take as a company.

It takes collaboration and cooperation to achieve a shared goal – how do you empower your staff to work towards this vision?

Our employees play an essential role in helping us achieve our vision. Their day-to-day work is critical to our success and we believe in empowering our people to deliver our vision. This means providing them with the training, resources, and support they need to do their job effectively, as well as creating a culture of trust, respect, and collaboration. We encourage and empower all our employees to take ownership of their work and to share their ideas and feedback openly. We believe that everyone has a role to play in contributing to our success and we recognise and reward our team for their hard work and dedication.

What is your approach to customer service?

Customer service is not just about delivering the product, it is the entire process from initial contact to ongoing support. We empower our team to listen to the customers' needs and support them throughout, building and nurturing relationships so we exceed their expectations every step of the way.

We understand that our success is linked to the satisfaction and loyalty of our customers. This is why we place great importance on our pledge to the "Global1Partners Customer Journey" ...we strive to make every interaction an exceptional and seamless experience.

We believe that this ongoing investment in the "Customer Journey" not only leads to more satisfied and loyal customers, but also to greater business success for all parties. By focusing on our Customer Journey, we can differentiate ourselves from competitors and increase customer retention.

With a recognised skills gap in the lift industry, how is Global1Partners working to bridge that gap?

We pride ourselves on a low staff turnover and have a highly skilled experienced team which enables us to invest in professional development through internal and external resources.

We view apprenticeships as an essential way to bring new talent into our business and to develop the next generation of skilled professionals in our industry. We offer a range of apprenticeship programmes and we provide our apprentices with hands-on experience, on-the-job training and mentoring from experienced professionals.

We believe that investing in our people is essential for the continued growth and success of our business and we are committed to providing them with the resources and support they need to excel in their roles and to achieve their full potential.

Sustainability and the carbon net zero journey are high on the agenda for most companies now. Tell us more about Green Gem, your energy intelligent solution for lifts.

For those technical readers among us, here are the facts!

Green Gem is a high efficiency bi-directional DC/DC convertor, integrating an energy storage module of ultracapacitors. A very simple connection of the unit to most VVVF drives is enough to transform the lift to a regenerative one with storage.

Green Gem stores what would otherwise be wasted energy on a regenerative trip and returns it back to the VF drive to be utilised on the next journey. It offers energy savings of up to 70% with no harmonic distortion and negligible stand-by consumption with a simple three-wire connection to both new and existing VF drives. With a simple connection to the DC Bus of the VF drive, the system automatically analyses and stores the regenerative energy in the ultracapacitors. The system then continues to analyse the DC Bus and returns the power when there is a consumption requirement. The ultracapacitor modules offer better power density and life cycling features than that of batteries. Therefore, they are the best possible solution for fast charging and discharging applications such as in lifts. Green Gem is the smart alternative to conventional re-gen.

	Green Gem	Regen Unit	Green Gem Advantages
Retrofit	✓	✗	It is possible to install the Green Gem to any existing lift with a VF invertor without mods and regardless of size.
Standby	✓	✗	Green Gem is between 150% -170% more efficient in regards to standby power, requiring only 3W.
Simplicity	✓	✗	Green Gem is easily wired to the DC bus. Regen solutions require extra filters for feeding back to the mains.
Real Savings	✓	✗	With a Green Gem fitted, the lift consumes less energy.
EMC	✓	✗	Green Gem works in DC reducing the consumption and harmonics of the installation.
Net Metering	✓	✗	Independent of the net metering policies per country, Green Gem is always going to mean real savings.
Installation	✓	✗	To fit a Green Gem, installation time is significantly reduced compared to fitting a traditional Regen.
Sizing	✓	✗	Green Gem must be sized in relation to the power generation and not the consumption. Regen must be sized according to the consumption.
Availability	✓	✗	All Green Gem units are the same size and stocked at Global1Partners for next day UK delivery.

Overall, our Green Gem offers significant benefits for the environment, customers, and building owners, making it an important innovation in the lift industry. It contributes to energy efficiency, reduced carbon footprint, cost savings and ease of use.

What's next for Global1Partners?

As a leading lift equipment supplier in the UK, we are committed to continually improving and expanding our services to meet the evolving needs of our customers and we are committed to continuing to invest in our people and culture.

At the start of February, my colleague Susan Terry and I were delighted to accept the position of Joint General Manager at Global1Partners. Susan joined the company 26 years ago, progressing through the ranks and gaining exceptional knowledge throughout the sales, marketing and operations areas of the business. Over the last 23 years, I have been fortunate enough to work alongside a team of dedicated engineers who have helped me develop a deep understanding of the technical aspects of our business. Together Susan and I have built a professional team and this Joint General Manager structure allows for increased collaboration, diverse perspectives and efficient decision making, resulting in a dynamic and effective leadership for the company's future success. This appointment marks a new era of growth and innovation for our company, taking us forward to our next exciting chapter.

To find out more about the company, visit their website - *https://uk.global1partners.com/*

LETTER FROM INDIA

ISEE 2022 Expo held on Dec 1, 2 & 3 2022 at Mumbai

Setting the tone for India to become a global manufacturing hub for the elevator and escalator Industry

The International Sourcing Expo for Elevators & Escalators (ISEE) 2022, a new show by TAK Expo Pvt Ltd was held over 200,000 ft2 at Bombay Exhibition Centre, Goregaon in Mumbai in December 2022.

150 International and domestic exhibitors involved were involved and the show saw more than 14,000 visitors, setting the tone for India to become a global manufacturing hub for the elevator and escalator Industry.

The Expo was supported by the Elevator and Escalator Component Manufacturers' Association of India (EECMAI), the IEEMA (Elevator and Escalator Division), CTBUH India Chapter, Fire and Safety Association of India (FSAI), Forum of Critical Utility Services (FOCUS), International Association of Elevator Consultants (IAEC), EFESME, ANACAM and the Bangladesh Elevator, Escalator and Lift Importers Association.

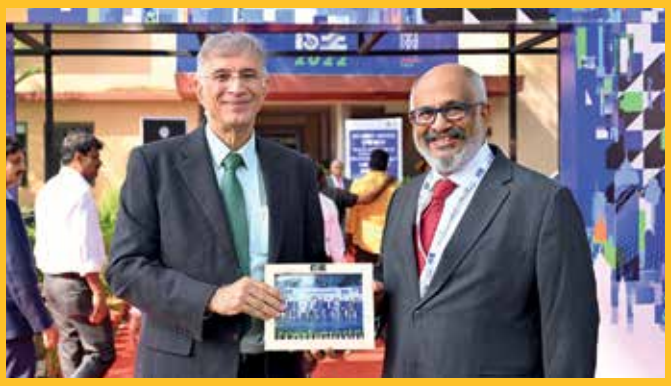
The national anthem opened the event, followed by a remembrance of industry colleagues and a book release of Trouble Report – the story of one of the veterans in the industry.

Inauguration team

Inauguration – lamp lighting

Trouble Report – book launch

This was followed by the introduction of the two associations IEEMA and EECMAI and an industry update.



Chief Guest - Dr. Niranjan Hiranandani with Mr. T A K Mathews

The Chief Guest for the Expo was Dr Niranjan Hiranandani, Vice Chairman National Real Estate Development Council (NAREDCO) and Co-Founder and Managing Director of the Hiranandani Group. He spoke of the growing demand in the real estate sector and said that elevator, escalator and component manufacturers in India were in the right place at the right time. He urged the industry to focus on the four Ss – Safety, Sustainability, Speed and Service – to be globally competitive and successful.

Three new products were launched at the booths of APSON, ARKEL and WITTUR.

- Arkel launched the Arboxx and the Armaxx control system.
- Apson launched their heavyweight and high-speed series of elevator traction machine.
- Wittur unveiled Stellar landing door, the latest development for the mid-range elevator market in India, with an execution compliant with Indian rules and codes.

Otis also introduced its new generation of Gen3 elevators, which uses the Otis One IoT digital platform and the Compass 360 elevator dispatch management.

SEMINARS AND DISCUSSIONS

Conferences and panel discussions over the three days were well attended.

Sessions covered:

- The importance of new age technology in real estate, with speaker Jay Morzaria, President NAREDCO and eminent builders, architects and MEP consultants.

- **'Architecture and Engineering are Inseparable'**, moderated by the Forum of Critical Utility Services (FOCUS), with Ravishankar Thandavan on India's goals of sustainability, net zero and decarbonisation.

- Integrating the multi-disciplinary functions in construction by V Suresh, with over five decades' experience in the building industry and holding more than fifteen awards in construction

The second day saw a panel discussion on Challenges in a Mixed-Use Building design, chaired by Girish Dravid, India representative of CTBUH. The discussion centred on how the circulation patterns in the different components of the building have to be thoroughly understood. Girish spoke about how mixed-use buildings evolved on the walk-to-work and entertainment concept, but have brought other challenges like security management, access and egress, safety and evacuation, which all need to be incorporated into the design. Girish highlighted how in some metros the emphasis is on monetisation of the last bit of available space, with scant regard to the need for break-out spaces like a courtyard, and said building regulations should ensure such spaces are provided.

A discussion on Building Evacuation During Emergencies was facilitated by the Fire and Security Association of India and included representatives from the Lift Inspectorate and the Directorate of Fire Services. There was extensive discussion on Schedule D of Part 4 of the National Building Code which deals with Fire and Life Safety, followed by a discussion on 'National Standardisation for Lifts and Escalators.' The panel included members from the Bureau of Indian Standards (BIS), the National Building Codes (NBC) and the State Lift Inspectorate.

The BIS member secretary, who explained India had members on the technical committees of IEC and ISO, said the national standardisation for lifts and escalators had considerable significance, considering that out of 29 states in India, only 11 had a Lift or Elevator Act. Of these 11, five states had been progressive and declared the India Standard would comprise the Lift Rules of that State, which would automatically be revised when the standard was amended.

Recent changes to the codes and standards include provisions for firefighters' lift and emergency evacuation, machine-room-less elevators, destination control systems, performance measurement and energy efficiency of lifts, requirements for meeting lateral shift, building sway and seismic activity.

On the final day, a discussion on 'It Pays to Pay More for Safety', looked at public trust in elevator and component manufacturers, purchasers, users and other stakeholders. The importance of proper installation, maintenance and operation of elevators was stressed, as was the need to make safety non-negotiable, accompanied by education, as well as legislation, to be effective.

This final discussion, about 'Global Elevator Markets', began with an overview of the Indian elevator market. The moderator, G Shankar of Madras Consulting Group, said that in the past 20 years the Indian economy had grown at an average annual rate of 6.2%, but that the elevator market had grown faster at around 7%-8%, albeit with a blip in 2020, due to the pandemic. It is expected to close the current financial year at about 84,000 units. Growth had not been limited to a handful of metros but spread over smaller tier II cities as well.

Other panelists elaborated on market trends and key technology developments in the geographical areas they represented, spoke of possible export opportunities for Indian component firms and other opportunities for co-operation.

TAK Mathews, Director TAK Expo, organisers for the ISEE, said: "The International Sourcing Exposition for Elevators & Escalators (ISEE) has been conceptualised to bring together OEMs and component manufacturers in the elevator industry and to showcase India as a Sourcing Hub. India has the manufacturing capability and prowess to compete at an international scale. India has the potential to become an alternative to China. That is why we got everyone on this platform to move forward together. In addition to domestic companies, we had participation from Germany, Italy, Switzerland, and Japan. This exhibition was an opportunity to witness the latest technology in Elevators and Escalators. The event also has proved to be a platform for the industry players to share best practices. I thank all exhibitors, vendors, our team and everyone associated with the show for their lasting and undeterred trust in us."

A first-time Expo activity exclusively for exhibitors – 'Bring Children to Work' – highlighted the essence of safety.

The activity, organised by the Elevator & Escalator Safety Trust (EEST) on 3rd December, gave an opportunity for a children's interactive session about safety while using an elevator or an escalator. They got a glimpse of what their parents do and were thrilled to witness first-hand the various stalls.

They were each given a safety jacket, helmet, personalised badge, certificate and goodie bag, and saw an interactive video. They showed a sense of belonging to the industry, and after a Q&A session their awareness levels were impressive.

The curtain fell on the three-day expo with exhibitors dancing to the resounding boom of dhol-tasha, an ethnic drum ensemble. Exhibitor feedback said it all: **"ISEE is where the industry meets!"**

The next ISEE, from 5th to 7th December 2024, promises to be bigger, showcase across a wider area and welcome a larger number of exhibitors, from within India and across the globe.

SEE U @ ISEE !

ISEE 2024 DECEMBER 5th 6th 7th MUMBAI, INDIA

A LIFE IN THE DAY

Talking Sustainability with Paul Turner

Paul Turner has been around the lift industry his whole life. Now as Technical Director for Schindler, he's also recently added Sustainability Manager as well as LEIA President (Lift and Escalator Industry Association) to his growing list of titles. We caught up with Paul to discuss his priorities for Schindler, and the lift industry as a whole, as well as where he sees trends rising in the future.

ALTHOUGH HIS FAMILY HAS ALWAYS RUN LIFT COMPANIES, PAUL TOLD US HE HASN'T ALWAYS BEEN IN THE INDUSTRY.
"I was used to seeing and talking about lifts, but I carved out my own career, working for the UN for 10 years. But there comes a time when you need to refocus! So I started working for my father's lift company, then my brother's, and in 2012 joined Schindler, becoming technical training manager and working through more senior roles to Technical Director for UK and Ireland, in 2015. I head up the FQE division – Field Quality and Excellence – providing support functions for the operational parts of the business. We're only a success if our operational teams are a success, so we give them the tools, methods and processes for them to flourish."

AS TECHNICAL DIRECTOR, A LOT OF PAUL'S ROLE REVOLVES AROUND SAFETY AND TRAINING. HE TOLD US ABOUT HOW HIS RESPONSIBILITIES STRETCH ACROSS THE ENTIRE BUSINESS.
"FQE centres around safety – employee, product and user safety, including testing of lifts, safety inspections, quality management and assurance and sustainability. I'm also responsible for training and learning, including our apprentices. We have constructed a brand new training centre in the UK, a facility with classrooms, workshops and simulators where our fitters and service technicians can train. It's also the home of our apprentices. Our three-storey training tower has our brand new F3 product installed which we use for looking at installation methodologies, commissioning and testing.

"Safety is our number one priority, ensuring everyone who works on or uses our products knows that safety is at the heart of what we do. Safety ties into our sustainability focus, which we prioritise through our ESG strategy – looking at the environment, society and governance."

To find out more about the company, visit their website - *https://group.schindler.com/en.html*

ESG IS AT THE CENTRE OF SCHINDLER, WITH THESE CORE VALUES DRIVING THEIR DIRECTION. THEIR RECENT ACKNOWLEDGEMENT BY CDP* OF BEING AN A-LIST COMPANY RECOGNISES THEIR FOCUS ON SUSTAINABILITY. PAUL EXPLAINED HOW THEIR ESG STRATEGY MOTIVATES HIM AND HIS COLLEAGUES EVERY DAY.

"We don't just pay lip service to ESG, these core values are lived and breathed every day by everyone in the organisation. We are committed to reducing our impact on the environment – the E of ESG – throughout our entire value chain and product lifecycle, meaning that we promote resource efficiency and develop our products with reducing environmental impact front and centre of our minds. We have a commitment to be carbon net zero by 2040, adopting science-based targets for reducing Scope 1, 2 and 3 emissions and ensuring our supply chain is more energy aware, improving energy efficiency in our products as well as looking at how we supply our service.

"The S of ESG – society – sees us focus on people. This includes learning, training, diversity and our communities. It's about attracting diverse talent with a vision for sustainable innovation as well as reflecting the diversity of our customers, partners and the communities in which we operate. By increasing our collective intelligence, it gives us the ability to innovate. At Schindler we operate with an inclusive work culture which allows us to better listen to our customers and means our diverse employees can thrive. We have found that we operate best with a wide range of voices – our UK leadership team, for example, incorporates around eight different nationalities, and an equal split of men and women. We've found a huge benefit to our decision-making process through having that mix of different backgrounds and experiences, with multiple perspectives and diversity of thought.

"Our G of ESG – governance – outlines our ambition to be leaders in governance and compliance by education, examination and enforcement. We are so proud of our employees who commit themselves daily to the highest ethical standards of performance and personal conduct in all interactions with customers, colleagues, regulators, competitors and the communities we operate within. It's about doing business in the right way – whether that's having financial integrity or signing up to UN charters. We want to put ourselves under the spotlight for good governance."

WITH A BROAD VIEW ACROSS THE ENTIRE INDUSTRY, PAUL EXPLAINED WHERE HE SEES THE POTENTIAL FOR INNOVATION AND DEVELOPMENT OVER THE NEXT FEW YEARS.

"There are three areas I think we will see grow exponentially in the near future. These are:

1. Improved safety in new installations. There is great potential for further automation in new lift installations. At Schindler we have climb lifts and jump lifts as a method that replaces scaffold or temporary lifting equipment in new builds. The lift shaft grows as the building is built, using the jump or climb lift solution. We use Schindler R.I.S.E – robotic installation system for elevators – robots install fixings and brackets within the lift shaft, working their way up and drilling holes and putting fixings in overnight so building work can continue the next day. There is so much scope for further innovation in safety, using automation.

2. Connectivity – IOEE – the internet of elevators and escalators. There is great potential for connected products, improving communication between building owners, technicians, passengers, facilities managers and contact centres. Centralised dashboards showing lift data will increase efficiencies, and lifts themselves will evolve from silver boxes to contain moving images on wall-sized screens inside.

3. Sustainability – I think there will be an increased focus on sustainability, and it will be given much more priority, significance and importance throughout the installation, use and service of lifts, across everything that we do. Sustainability is not just about the environment, it's about thinking ahead, investing in people and ensuring your business is here, and thriving, in the future."

AS THE NEW PRESIDENT OF LEIA, PAUL HAS TAKEN RESPONSIBILITY FOR REFRESHING THE STRATEGY AND CREATING A MORE SUSTAINABLE ORGANISATION. HE TOLD US ABOUT HIS PRIORITIES THIS YEAR.

"We're currently discussing priorities and will look to agree on a road map to create a clear direction for making the lift industry more sustainable. I want to take a hands-on approach to forging good working relationships with like-minded people, with the board focusing on directing the lift industry to an attainable goal. We will work together, with a vision to lead an industry which ensures we promote sustainable development of towns and cities, through technology and innovation, promoting environmental commitments and providing the tools, methods and processes to make our industry as sustainable as it can be."

To find out more, please visit - *https://www.leia.co.uk/leia-welcomes-paul-turner-as-new-president/#:~:text=Paul%20Turner%2C%20Technical%20Director%20at,lift%20companies%20and%20subcontractor%20businesses*

OUTSIDE HIS BUSY JOB, PAUL HAS JUST BUILT A NEW HOUSE FOR HIS FAMILY AND IS ALSO A FOOTBALL MANAGER FOR NEW MILTON TOWN FOOTBALL CLUB, PLAYING AT STEP SIX IN THE WESSEX FOOTBALL LEAGUE. PAUL MANAGES HIS TEAM IN THE SAME WAY HE MANAGES HIS WORK; WITH A LASER FOCUS ON PEOPLE.

"People are my main passion in life. For me, it was important to create a football team with core values at the heart of everything we do. It's about respect, integrity and the way we treat and talk to each other. I also want to drive a sustainable club, playing a style of football that can be shared with youth teams. There were no younger teams coming up behind the current players, so from next season we'll have boys under 18s and under 15s teams, a ladies team, girls under 16s and under 14s teams as well as our under 23s development team. We want to grow our girls, boys, youth and development teams so they will feed upwards, for a sustainable future. I can only do this with the support of an incredible team; assistant manager, coaches, physio, and a great squad of lads who do most of the hard work. Without these people around me it would be impossible." **Thank you to Paul for giving us such a great insight to his passions and priorities. Find out more about his plans for LEIA here and see Schindler's website here.**

** CDP is a not-for-profit organisation, running the global disclosure system for carbon emissions and is the gold standard of environmental reporting.*

Unlock your building's sustainability

Sustainability matters to you. It does to us, too. Our Schindler PORT solutions have been designed with sustainability at the forefront. Moving people seamlessly through buildings has never been easier – and greener. With our pioneering Schindler PORT ECO Mode, your elevator system's energy consumption can be reduced by up to 40%*. How? Our destination dispatch system works in the background to optimise each elevator journey.
Find out more at www.schindler.co.uk/port

*Calculations are made in comparison to prior Schindler PORT Technology software releases and refer to a specific customer configuration. Usage pattern, load capacity, customer specific options, and site conditions may influence the final calculation.

We Elevate

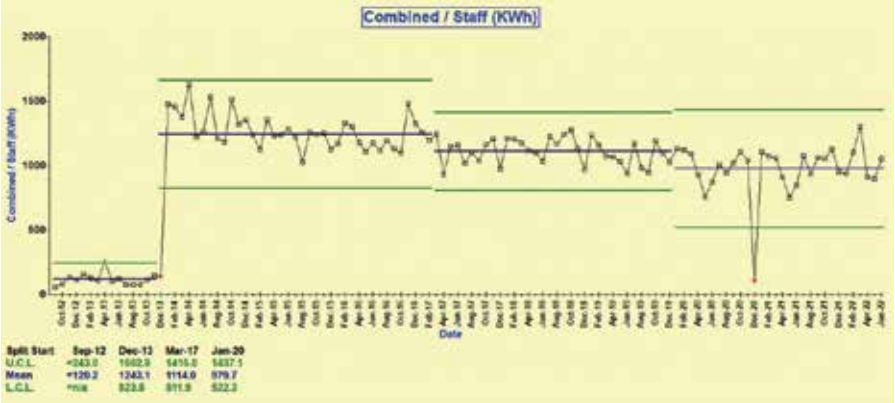
Schindler

GETTING TO NET ZERO

Today, across the world, we are all experiencing changes in weather patterns, hotter summers, heavy rainfall and storms, all of which are affecting the environments in which we live.

These changes in our climate are the most significant issues our planet is facing and require determined action from individuals and businesses alike, to help lower the levels of carbon in the atmosphere and protect our future.

Jackson, the UK's largest independent Lift, Escalator and Cradle maintenance provider, has been working for over a decade to significantly lower their overall energy consumption. This resulted in achieving the ISO 14001 Environmental Management accreditation in 2013. However, this wasn't the only environmental standard Jackson wanted to attain and in 2014, they were awarded the ISO 50001 standard for Energy Management. With this important standard gained, Jackson were clearly on the carbon reduction path. Since achieving these environmental accreditations, Jackson has been successful at reducing their monthly energy consumption by 21%. The impressive reduction in energy consumption between 2012 and 2022 reflects their commitment towards their Net ZERO objectives.



The above shows consumed energy levels dropping over the period October 2012 to June 2022

Another milestone for Jackson was in 2019 when the Company decided to ramp up their energy efficiency programme and commenced with their electric fleet programme, which started with installing EV charging points at all of their owned properties. In 2019, electric vehicles were included within their Company car policy and they have ordered several EV vans. Also in 2022, Jackson formalised their Net ZERO approach and included it within all of their marketing material used at Liftex 2022.

Greenwashing is not for Jackson

The Company strongly believes that carbon offsetting is a way of obscuring a company's climate-changing credentials and does not address the root causes of our climate problem, views shared by many other ethical businesses.

The Jackson approach towards Net ZERO is not to commodify nature by purchasing trees, but to better manage and take responsibility for their impact on the environment. We were told by Jackson Director, Paul Ringer, 'you have to do it right and not greenwash even when it's hard to, if you value the environment and our world as we do'.

To help Jackson achieve their Net ZERO by 2030 climate pledges, the Company is participating in Grosvenor's SME Mentoring Programme which is being delivered by Heart of The City. They have also joined SBTi (The Science Based Targets initiative). SBTi is the world's first, fastest growing and most reputable climate mitigation initiative in the corporate sector.

This climate mitigation initiative is the world's first Corporate Net-Zero Standard framework for net-zero target setting, in line with climate science and the limiting global temperature rise to 1.5°C. The support that Jackson will receive from SBTi will undoubtedly help to achieve their gold standard 2030 carbon reduction pledge.

Jackson Net ZERO 2030 goals and achievements:

- Establishing their first carbon-neutral office building in 2023, by installing solar PV, battery storage and air-source heat pumps.
- Commitment to having a carbon-neutral vehicle fleet by 2028. All commercial vehicles being ordered beyond 2024 will be electric.
- Jackson is currently working with their logistic and workwear suppliers to provide carbon-neutral and sustainable alternatives. All old workwear is already recycled.
- Office electricity only sourced from 100% renewable generators including a mix of wind, solar, bio and hydro.

Jackson

Lifts | Escalators | Cradles

Keeping our customers moving since 1979

jacksonlifts.com

Maintenance | Repair | Modernisation | New Lifts

New Escalators | Disabled Access Equipment | Facade Access

NEWS FROM THE CIBSE LIFTS GROUP

The CIBSE Lifts Group is formed of members who have an interest in vertical transportation. The group meets regularly to promote technical standards, training and education, publications and various aspects of the industry.

The CIBSE Lifts Group AGM 2023 was attended by many familiar faces of the lifts and escalator industry, in-person at the HQ building in Balham.

New committee members were elected including Michael Bottomley as Chair and Phil Pearson as Vice Chair. Paul Clements is newly elected to help with press and publicity.

Adam Scott will resume his role as BSi Representative after four years as Chair. We thank him for his dedicated service especially through the pandemic.

The AGM was followed by an evening seminar with guest speakers Matt Davies from AVIRE and Jason Godwin from 2N which attracted an excellent debate during the Q&A session.

Dates for the 2023 events were also shared. Details and minutes of the AGM are published on the CLG website at ***https://www.cibse.org/get-involved/special-interest-groups/lifts-group***

Above in photograph left to right: PAUL CLEMENTS Press & Publicity, WEE CHUAN LIM Secretary, MICHAEL BOTTOMLEY Chair, VINCE SHARPE SAFED Representative, GINA BARNEY, Events Organiser (South) and Technical Editor CIBSE Guide D, JOHN BASHFORD Event Exhibition, DAVID COOPER Training Development, ADAM SCOTT BSi Representative
Not in the photograph: PHIL PEARSON Vice-Chair + Events Organiser (North of England), RICHARD PETERS Treasurer, STEFAN KACZMARCZYK University of Northampton Representative, NICK MELLOR LEIA Representative , RORY SMITH International Representative USA, JOHN CARROLL International Representative AU

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DAVE COOPER appointed as a CIBSE Vice President

New CIBSE Officers, Board Members and Council Members take office each year from the AGM in May. Officers and Board Members serve on the Board, which is the Institution's governing body. It comprises the seven Officers (President, President-Elect, three Vice-Presidents, Honorary Treasurer and Immediate Past President) and five Board Members.

The Institution's By-Laws and Regulations require that all candidates for Officer and Board Member vacancies arising at the AGM be considered by the Institution's Nominations Panel, to which all sections of the Institution are invited to suggest candidates for consideration.

The Panel gives careful thought to its recommendations and seeks to reflect Charity Commission guidance by nominating a range of candidates with the skills and experience required to fulfil the Board's role as the governing body of a significant registered charity.

It also seeks to ensure that the Board includes a balance of representation from different industry sectors. Having considered the advice of the Panel, the Board then nominates candidates for President Elect and Board Member vacancies.

The Board's nominated candidates for vacancies arising at the AGM in May 2023 are:

President Elect:

FIONA COUSINS
CEng FCIBSE;

Honorary Treasurer:

VINCE ARNOLD
CEng FCIBSE;

Members of the Board:

MIKE BURTON
CEng FCIBSE,

MARK WALKER
CEng FCIBSE

The Board, having considered the Nominations Panel's advice, also appoints three Vice-Presidents to take office at the next AGM.

These appointments are normally made from those who serve or have served on the Board, and all those listed below are current or past Officers or Board Members.

The Board's appointments to take office in these roles from the AGM in May 2023 are:

Vice Presidents:

DAVID COOPER
CEng FCIBSE,

LAURA MANSEL-THOMAS
CEng FCIBSE,

LES COPELAND
CEng FCIBSE

The Council is a larger consultative body that advises the Board on Institution policy. It includes representatives of Regions, Societies, Groups, Networks and Standing Committees, and elected members, who serve a three-year term.

The Board has agreed to operate a similar procedure for election as that applying to Board members, and two corporate and one non-corporate positions are available for election each year.

The Board, having considered the advice of the Nominations Panel, agreed to nominate the following for vacancies arising at the AGM in May 2023:

Members of Council: Aleksandra Krstanovic (corp), Peter Anderson (corp), Emeka Osaji (non-corp)

Article from CIBSE Journal January 2023

CIBSE seeks Net Zero Head Office in London's Zone 1

After 44 years in its current Balham home, CIBSE has announced that it is seeking to move its head office to a central London address. The Institution has set up a Premises Advisory Committee (PAC) to find a suitable property that aligns with its goals of decarbonisation and building safety. Ruth Carter CEO said: 'CIBSE needs a head office that is modern, highly functional, easily accessible for our members and our staff, and, most importantly, lives our CIBSE standards – not least our net zero ambitions.'

The PAC has identified the fringes of the City of London as an ideal location. Accessibility to Members, particularly from overseas, was a key factor in the selection, said Carter. 'The Circle Line is perfect for accessibility and, in terms of affordability, you get really good bang for your buck,' she added.

CIBSE president-elect Adrian Catchpole FCIBSE said any building being considered will be assessed to evaluate the role it can play in the Institution's aspiration for net zero and in demonstrating best practice.

'It's up to us to demonstrate pragmatic ways to achieve the best [performance] from our buildings, for a modest amount of money,' he said. Although Carter would like to be 'in before Christmas', there is no timeframe.

CIBSE paid £180,000 for 222 Balham High Road in 1978, after moving from Cadogan Square. Explaining the CIBSE Board's decision to move, Carter said: 'Balham head office no longer reflects CIBSE's values and credentials, and is not the 'shop window' for one of the most influential and impactful global Institutions.'

CIBSE President Kevin Mitchell FCIBSE said: 'A new facility presents an opportunity to show what we are and what we want to be. This is the biggest project we have done in a generation and we are really excited about it.'

Article from CIBSE Journal February 2023

REPORT ON TKE ESCALATOR EVENT

DAVE COOPER

I had the great pleasure of being invited to the TKE new Velino escalator launch and safety presentation held at their Hamburg facility on 2nd February 2023.

Over 120 industry colleagues attended from around the globe and were initially presented with a history of TKE and its products by Executive Vice President Product & Supply Chain (Christoph Buss) and the factory's Managing Director (Tobias Jäger)

The origin of the escalator factory goes back to 1865 with production of bridges, sub-frames for sewing machines and safes. The first escalator was produced in 1950. Since then it has manufactured around 60,000 escalators. A quick calculation reveals that this equates to around 822 escalators a year or 68 a month.

By any means that is some statistic churning out around 3 escalators a day!

The facility at Hamburg covers an area of 125.000m² and employs 100% green electricity, another impressive statistic, and thus reduces the carbon impact significantly. There are 370 employees based in the facility including 20 apprentices and readers of my regular column in LIFT INDUSTRY NEWS won't be surprised to hear me express my delight at the investment in apprenticeships. I am not singling out TKE for praise here as I know other companies take on apprentices and I commend all that do.

We were then welcomed into the manufacturing area of the facility including a visit to the assembly, welding, sheet metal and truss fabrication areas. TKE have made the decision to manufacture their trusses using in house expertise thus increasing efficiency.

Safety and aesthetic related presentations were included in the event including digital mirrors and in truss ultra violet handrail cleaning. Again, I was delighted to hear that they only offer in-truss installation of this device as this means that there is no contact with passengers thus eliminating the risk of finger entrapment at the handrail. Aesthetic options were also covered by an outsourced glazing supplier who demonstrated an impressive array of colour options which will be attractive for both architects and owners alike.

Further presentations included digital solutions presented by Elena González Ruibal. It was lovely to see Elena again having penned a paper with her on escalator safety which was presented at the 2015 annual symposium in Northampton. Elena's presentation included MAX, agile and api as digital options. These options are based on machine learning, IOT and takes data and turns it into a meaningful output for owners including smart maintenance, monitoring and control. The ultimate outcome is that breakdowns are avoided where possible and responded to quicker in the event they do happen. The digital solutions have been taken up in 9 countries with over 900 escalators connected.

Frank Lunderstedt made a presentation on prevention of falls over the sides of escalators. Again, a subject dear to my heart having been the subject of my MPhil thesis which was published in 2011. Its good to see the product being expanded into the marketplace having been legislation in Norway for many years.

We also received a presentation about a project in Holland by the head of the factory's own installation team, Niyazi Yildiz, where 8 escalators were removed and replaced in a timescale of less than 36 hours.

Chris Harmon presented on the latest research into step to step entrapment and the MotionIKON product which significantly reduces the coefficient of friction at step risers. My column in this edition of LIFT INDUSTRY NEWS into the passenger contribution to escalator accidents supports this report into my visit and whilst there is little we can do with respect to the footwear passengers choose where we, as an industry, can make a contribution to safety we should be doing so. I have asked Chris to prepare a fuller paper into his research for another edition. The product can also be used to spread the safety message to passengers which provides an additional benefit. Beside this substantial safety aspect there is also a great opportunity for clients to use panels for advertisement. The advertisement opportunities on steps, balustrades and traffic light columns was explained by Karsten Kambach, Head of the Sales Support Team, who also organised this Clients Experience Day.

To complete my report I'd like to mention the new Velino escalator which was on display in the demonstration area. The demo version showed various specification options that will be attractive to owners including under handrail lighting, digital balustrades, the in-truss UV handrail cleaner and many more.

It was a great event and those I spoke to were really positive about it. I certainly came away having learnt a lot and it was good to catch up with so many industry professionals.

THE E OF ESG AT THE DEWHURST GROUP

The "E" in ESG refers to a company's impact on the environment. This includes factors such as carbon emissions, waste management, and natural resource usage.

A consensus has emerged in recent years that environmental, social, and governance (ESG) issues are crucially important for businesses.

The "E" in ESG refers to a company's impact on the environment. This includes factors such as carbon emissions, waste management, and natural resource usage.

The Dewhurst Group, is committed to improving sustainability, embedding it into every aspect of their business operations from their supply chains through to the communities in which they operate.

By 2027 Dewhurst Group aim to reduce Scope 1 and Scope 2 carbon emissions by 50% compared to 2020. They have already seen a significant reduction through investing in green electricity.

SOLAR POWER

SOLAR POWER

In October 2022 they installed 207 kWp capacity solar panels at the Feltham site, in addition to 60 kWp solar panels already installed at Dual Engraving in Perth, Australia

They have invested in more energy-efficient equipment and electric vehicles for their staff, decreased water consumption, reduced raw material consumption and waste, and reused packaging materials.

RECYCLE, RECYCLE, RECYCLE

At a recent site visit Lift Industry News were shown all the recycling bins of the plastic 'trees' from the manufacturing, the metal and how their packaging materials are reused and circulated between the group subsidiaries annually – that's over 300kg of packaging.

At A&A investment in a cardboard shredder to use the cardboard that enters the site as the box infills on their own orders that are leaving the warehouse, recycling about 1 tonne of cardboard a month, saving on the cost of skip collections and the cost of buying in packaging filling.

The aim is to move to fully recyclable packaging in all their UK companies by 2025.

PLANT A TREE

Both A&A and TMP Ltd., the leading traffic management product brand who are part of the Dewhurst Group, partner with Ecologi to plant trees. Between them they have planted nearly 78,000 trees and funded 40 projects.

Ecologi is a British company that supports a broad range of projects that are able to evidence that they are reducing or avoiding greenhouse gas emissions. One of the best tools to tackle the climate crisis and keep our temperatures from rising above 1.5°C is to plant trees. They are also crucial in preventing ecological collapse. Ecologi have a range of amazing reforestation partners like A&A and TMP, who are growing millions of trees per month.

GREEN APPLE ENVIRONMENT AWARD WINNER

AWARD WINNING

in November 2022 TMP Ltd won the Green Apple Environment Award for Helping the Environment for their innovative and eco-friendly NonCrete Bio-Polymer bollard. It is made from sugar cane, weighs 3.5kgs, is fully recyclable, and is easily transported, lifted, and fitted into place. Due to the ability of sugar cane to absorb CO_2 as it grows, NonCrete Bio-Polymer bollards generate negative -1.0 $kgCO_2e/kg$, compared to their 8.6$kgCO_2e/kg$ concrete counterparts.

The Green Apple Environment Awards were launched in 1994 by The Green Organisation and have become well established as one of the most popular environmental campaigns in the world.

LIFT & ESCALATOR SYMPOSIUM

14TH SYMPOSIUM ON LIFT & ESCALATOR TECHNOLOGIES

20 - 21 September 2023

www.liftsymposium.org

Lift and Escalator Industry Association LEIA

University of Northampton

CIBSE Lifts Group

COUNTDOWN TO THE 14TH SYMPOSIUM

Behind the scenes work is well underway for the 14th Lift & Escalator Symposium which returns to the Hilton Hotel, Northampton this September.

Date: 20 - 21 September 2023
Where: Hilton Hotel, Northampton

Cost: Regular Delegate - £320, Supporting Organisation Delegate £260, Student & Retired Delegate £190.

www.liftsymposium.org

Don't forget there is an early bird booking discount available until 30 June. Further discounts are available to members of CIBSE, LEIA and the University of Northampton.

"I would recommend attending to anyone who hasn't attended in the past and to come with an open mind. Review the abstracts in advance but wait until you have seen the presentation before forming an opinion regarding the subject relevance to you - I often find I am most engaged by the presentations that I don't expect to be!"
Brian Preston, General Manager - CP Automation UK Ltd

"The symposium has a wide range of presentations. I have yet to come away from one without a paper prompting debate, discussion or learning something new."
Mike Turner, Director, Lester Controls

"It's a fantastic place to get educated on the latest technologies. A good opportunity to meet old colleagues, and it's also helpful for anybody starting a new career in the industry to gain valuable information."
Andrea Preece, Business Development Manager, Digital Advanced Control

The Lift and Escalator Library

»www.liftescalatorlibrary.org«

Is an online library for the lift (elevator) and escalator industry.

It provides free access to an extensive collection of papers made available to support education and research.

LIFT & ESCALATOR SYMPOSIUM

An Initiative Of The Lift & Escalator Symposium Educational Trust
Registered Charity No: 1170947

CIBSE Lifts Group

University of Northampton

Lift and Escalator Industry Association LEIA

LIFT & ESCALATOR SYMPOSIUM

This paper was first published at the 13th Symposium on Lift and Escalator Technologies, 21-22 September 2022, organised by The Lift and Escalator Symposium Educational Trust. For more information see ***www.liftsymposium.org***

ENERGY EFFICIENT BUILDINGS ASSESSING THE IMPACT OF LIFTS

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Keywords: lift, energy, carbon, embodied, operational.

Abstract: As the impact of climate change becomes ever more visible, society appears at last to be reacting and making changes aimed at mitigating its impact and protecting our established ways of life. Most if not all human activity affects our planet, and the creation, operation, modernization, and replacement of buildings is no exception.

The lift industry therefore has an important part to play in minimizing its impact on our climate; the creation of new lift equipment consumes energy which is quantified by its embodied carbon credentials, whilst the use of lifts consumes energy characterised by its operational carbon credentials. These carbon credentials play a key part in the assessment of a building's energy performance and as an industry we now need to recognize this and refine both the processes and the accuracy with which we model the impact.

This paper explores some of the current guidance and assessment methodologies touching on such established documents as the British Standard BS EN ISO 25745 [1]. Application of these methodologies will be reviewed against a real-world case study, and conclusions and recommendations presented on how the industry might refine future assessments towards more realistic results.

1. BACKGROUND

Whilst the debate on the causes of changes to our climate may continue for some time, the fact that our climate is changing appears to be undeniable. This year's news seems frequently to feature stories from around the world reporting on the negative impacts of changing climate; from severe wildfires in California and the Mediterranean, to catastrophic flooding in Australia, to the driest July in the United Kingdom since 1935 [2].

Over recent years society and our governance has started to act introducing rules and regulations aimed at mitigating the impact of climate change. The UK introduced the Climate Change Act [3] in 2008 setting a legally binding target for 2050 to reduce greenhouse gas emissions by at least 80% compared to 1990 levels. Good progress is being claimed with a 38% reduction in UK emissions between 1990 and 2019 [4], however measured against the growing evidence and concern this was seen to be insufficient and in June 2019 the UK government went further with an amendment to the Climate Change Act setting a legally binding target to achieve net zero greenhouse gas emissions from across the UK economy by 2050. The scale of the challenge is clear to see, and the impact of failure for future generations unthinkable.

This paper however is not intended to spread doom and gloom, nor to expound on the issue of climate change. The scale of the challenge is daunting, and it is often hard to see the wood for the trees and to see what part, however small, we can play. This paper's intent is to provide some comment, guidance and opinion on where the lift and industry "fits" within the challenge and how best might our industry respond and play our part in driving down damaging emissions.

Back in 2015 the United Nations (UN) published their 17 Goals Sustainable Development Goals (SDG) [5], as shown in Figure 1 below.

Figure 1: United Nations 17 Sustainable Development Goals (SDG)

These goals, shared by all United Nations member States, are intended to provide a blueprint for peace and prosperity for people and the planet, now and into the future. They were and remain an ever more urgent call for action by all countries, and in the UK one of the major catalysts for the development of methodologies to achieve the government's net zero 2050 emissions target.

Buildings are complex with many interrelated elements such as structure, façade, mechanical systems, electrical systems, clean and wastewater systems, fire protection systems, and of course lift systems. The manufacture, shipping, installation, operation, removal and modernization of each of these systems produce damaging carbon dioxide (CO_2) emissions. Reducing the volume of CO_2 (typically referred to in this context as simply carbon) emitted during the lifetime of a system is the ultimate goal.

The carbon created over a system's lifetime is referred to as Whole Life Carbon (WLC) and in itself is a complex concept. It can typically be thought of as comprising two fundamental components:

- Embodied Carbon – the total CO_2 emitted in producing materials, estimated from the energy used to extract and transport materials as well as from the manufacturing process itself.
- Operational Carbon – the total CO_2 emitted due to the building's energy consumption in use.

2. ASSESSMENT METHODOLOGIES

In the UK many respected bodies have responded to the government's net zero legislation with guidance and methodologies for the assessment of carbon emissions. Key amongst these is the Royal Institution of Chartered Surveyors (RICS) methodology for undertaking detailed carbon assessments for buildings (RICS Whole life carbon assessment for the built environment professional statement 2017) [6]. Figure 2 below illustrates the modular structure of the RICS PS, which also aligns with the recommendations set out within BS EN 15978.

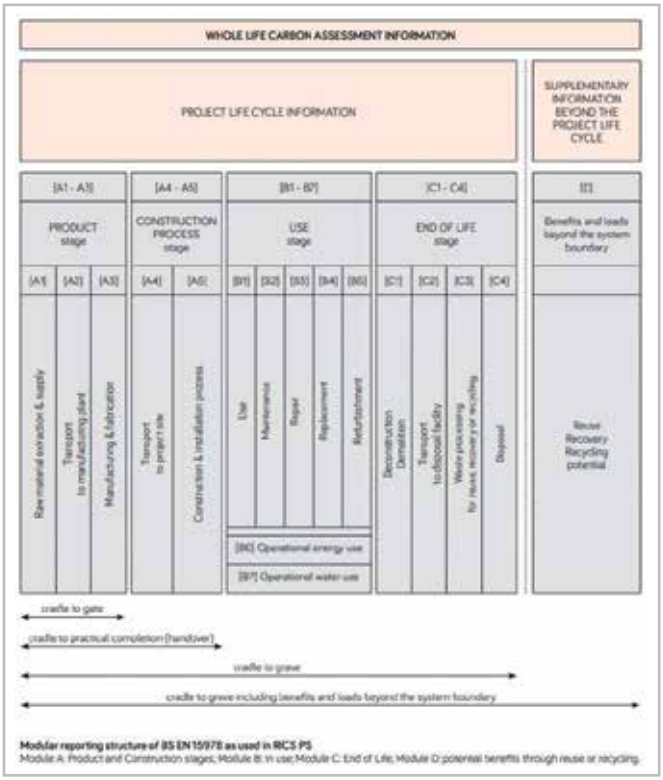

Figure 2 – RICS PS Whole Life Carbon Assessment Information

This approach covers both operational carbon in terms of energy use and water use (modules B6-B7), and embodied carbon emissions (modules A1-A5, B1-B5, C1-C4 and D). It is of note that module D provides opportunity for "credit" related to reuse or recycling of materials at end of life, supporting the circularity concept of maximizing the sustainability value of created materials.

For buildings WLC is typically reported in units of $kgCO_2e/m^2$ Net Internal Area (NIA), where CO_2e is carbon dioxide equivalent, which is a measure of all produced greenhouse gases associated with the system being presented in terms of the amount of pure CO_2 that would create the same amount of warming.

The carbon cost of materials is commonly assessed using Environmental Product Declarations (EPDs) which provide a range of data including embodied and operational carbon. The EPD process is strictly regulated and requires third party ratification. Assessments typically have a validity period beyond which a re-assessment must take place.

3. CASE STUDY

Given the diverse range of materials in a lift, and the global nature of the lift industry's manufacturing plants and installed product base, the challenge of accurately predicting and/or comparing the carbon cost of lifts may at first seem somewhat daunting. However, when viewed through the lens of "don't let perfect be the enemy of good" and an acceptance that it can never be 100% accurate, a set of necessary assumptions unlock the process and allow some 'compare and contrast' analyses to be completed.

Over the past few years, the lift industry has taken good strides in advancing the level of information published as EPDs. ISO 14026 and EN 15804 are typically used as standards to define core product category rules (PCR) for construction products such as lifts. The PCR defines a consistent approach for assessment and describes which stages of a product's life cycle should be in the EPD; this consistent approach is intended to provide the ability for different products to be compared in terms of WLC, with the ultimate goal that products with a lower carbon footprint are selected in preference to those with a higher impact.

However, this 'compare and contrast' process needs care in application; the data is detailed and complex and needs to be reviewed and interpreted by skilled practitioners. It is important to ensure the products being compared are truly equivalent. For example, it would not be appropriate to compare a 1000 kg, 1.0 m/s, 15 m travel, machine roomless lift with a 1600 kg, 4.0 m/s, 80 m travel, machine above lift; the speed difference will require different drives and machines, the travel difference will create longer guide rails, ropes and travelling cables, and the number of stops will create the need for more landing entrances. It is even important to review the assumptions made in terms of the electricity supply mix applied to the operation and manufacturing modules, and for this some understanding of the geographical location of manufacture and installation is required.

To provide some form of normalization a key PCR defines the concept of the Functional Unit (FU), a measure of the transportation of a load over a distance expressed in tonne (t) over a kilometre travelled (km), where:

$FU = \%Q \times S_{RSL}$

Where:

%Q is the average load (t) determined by selecting the appropriate usage category according to ISO 25745-2 Table 1 and multiplying the rated load Q by the applicable average load percentage as per ISO 25745-2 Table 3.

And:

S_{RSL} is the distance travelled over the lifetime of the equipment determined by the average travel distance (ISO 25745-2 Table 2) x number of trips per day (nd) (ISO 25745-2 Table 1) x number of operating days per year x service life of the equipment in years.

For example, consider a 1600 kg lift serving 9 floors over a travel of 40 m. The equipment has a predicted service life of 20 years, 365 days per year operation, and operates under a usage category 4:

$FU = \%Q \times S_{RSL}$

$FU = (0.035 \times (1600 / 1000)) \times ((0.44 \times (40 / 1000)) \times 750 \times 365 \times 20)$

$FU = 0.056 \times 96{,}360$

$FU = 5{,}396$ tkm

To illustrate the challenges of comparing and contrasting products from different manufacturers the author conducted an informal review of published EPDs for similar mid-range machine roomless lifts from three major suppliers. Extracted in the table below are key data from the EPDs for the manufacturing processes (A1 + A2 + A3) and the operational energy in use (B6). The environmental impact is represented by the Global Warming Potential (GWP).

Table 1 EPD - Comparison Electric Traction Machine Roomless Lift

Supplier	Representative Unit	Declared Functional Unit [tkm]	Upstream & Core Environmental Impact GWP [kgCO2eq/tkm]	Energy Consumption In Use GWP [kgCO2eq/tkm]	Total Considered GWP [kgCO2eq]
1	1000 kg 1.6 m/s 12 stops 35 m travel Usage Class 4 Service Life 20 years	1690	21.706E+00	7.89E+00	13,356
2	1000 kg 1.6 m/s 8 stops 21 m travel Usage Class 4 Service Life 20 years	3035	3.8767E+00	8.62E+00	37,928
3	630 kg 1.0 m/s 5 stops 12 m travel Usage Class 3 Service Life 25 years	761	11.232E+00	5.11E+00	12,437

So which supplier has the most environmentally friendly product? Well, it's hard if not impossible to say, at least from the data analyzed in this exercise. Whilst key characteristics such as rated load, speed, usage class and service life are the same for supplier #1 and #2, the travel and stops are different. Supplier #3's published data did not seem to include a 1000 kg lift of any configuration, so a smaller and slower 630 kg lift was selected, with a lower travel, different usage class, and longer service lifts. The EPD process requires a representative equipment configuration applied to a theoretical lifetime duty cycle. Unless the equipment and lifetime duty cycle, i.e. the Functional Unit (FU), is the same or similar, valid comparisons are hard to draw.

Perhaps a more transparent comparison, for the energy in use module at least, can be provided by the ISO 25745-2 methodology for the calculation and classification of energy performance for lifts. This standard defines the methodology for the classification of energy performance for a lift. It is somewhat simplified by necessity, and it is of note that the method is intended to only be applied to single lifts and therefore any energy efficiencies realized in dispatching logic across a group of lifts is not recognized.

Regenerative drive systems are also not clearly recognized by the method albeit some reference is made to a slightly different method for calculating energy for a lift that draws some or all of its energy from an energy storage system. It is also interesting to note the standard draws the reader's attention to the fact that there might be a deviation between calculated values and measured on site values in use, and that if this deviation is greater than 20% (a seemingly large factor), an investigation should be carried out.

The methodology set out in ISO 25745-2 is detailed and needs care in application but is logical and robust. It considers the following key elements, and the reader should consult the standard for the detail behind each one:

- Usage category and number of starts per day
- Average travel distance
- Average running energy per metre travel
- Running energy of an average cycle with an empty car
- Load factor and average car load
- Non-running (idle/standby) energy consumption
- Ratio of idle, 5 min standby, and 30 min standby modes
- Running time per day

Application of the above derives the calculated total energy consumption per day, which can then be converted to estimated annual energy consumption. Care should be taken in considering the number of days the lift will operate, for example in an office building it may be appropriate to consider the weekend as a period of predominantly standby mode energy consumption.

The application of the ISO 25745-2 methodology typically results in a table of results for a lift system which is then compared against the area of the building to derive a kWh/m^2/year. An example of such analysis can be seen below and represents a twenty-floor office building development in London.

Figure 3 Case Study ISO 25745-2 Energy Analysis

Category data	Symbol	Units	PL01/FL	PL02/EL	PL03	PL04	PL05	PL06	PL07/EL	PL08/FL	GL01	GL02	CL01
Category			5	5	5	5	5	5	5	5	4	4	3
Median number of trips/day for category (BS EN ISO 25745-2, Table 1)	nd		1500	1500	1500	1500	1500	1500	1500	1500	750	750	300
Total operating days per year (BS EN ISO 25745-2, Table A1)			260	260	260	260	260	260	260	260	260	260	260
Lift parameters, measurement data													
Rated load	Q	kg	1275	1275	1275	1275	1275	1275	1275	1275	2500	2500	1275
Rated speed	v	m/s	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1
Acceleration	a	m/s^2	1	1	1	1	1	1	1	1	1	0.9	0.9
Jerk	j	m/s^3	1	1	1	1	1	1	1	1	1.2	1	1
Door times	t_d	s	5	5	5	5	5	5	5	5	5	5	5
Total travel distance	s_{rc}	m	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	11.85
Reference cycle energy	E_{rc}	W·h	190	190	190	190	190	190	190	190	400	400	115
Idle power	P_{id}	W	260	260	260	260	260	260	260	260	370	370	220
Standby power	P_{st}	W	200	200	200	200	200	200	200	200	280	280	200
Average trip distance	s_{av}	m	21.57	21.57	21.57	21.57	21.57	21.57	21.57	21.57	24.33	24.33	5.81
Ratio average travel (BS EN ISO 25745-2, Table 2)	k_{av}	%	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.44	0.44	0.49
Percentage rated load (BS EN ISO 25745-2, Table 3)	(%Q)	%	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	2.2	2.2	4.5
Load factor (50% balance)	k_l	%	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.96	0.96	0.93
Idle percent (BS EN ISO 25745-2, Table 4)	R_{id}	%	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.45	0.45	0.36
Standby percent (BS EN ISO 25745-2, Table 4)	R_{st}	%	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.55	0.55	0.64
Energy calculation													
Specific energy	E_{spc}	mW·h/kg·m	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.45	1.45	3.81
Running time per day	t_{rd}	h	7.14	7.14	7.14	7.14	7.14	7.14	7.14	7.14	4.72	4.77	1.07
Standing time (the time the lift is not running)	t_{nr}	h	16.86	16.86	16.86	16.86	16.86	16.86	16.86	16.86	19.28	19.23	22.93
Time to travel the average travel distance	t_{av}	h	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	22.6	22.9	12.8
Running energy/day	E_{rd}	W·h	48101	48101	48101	48101	48101	48101	48101	48101	63619	63619	7829
Standing energy/day	E_{nr}	W·h	3,798	3,798	3,798	3,798	3,798	3,798	3,798	3,798	6,180	6,164	4,751
Total energy/day	E_d	W·h	51899	51899	51899	51899	51899	51899	51899	51899	69799	69783	12580
Total energy/day		kWh/day	51.9	51.9	51.9	51.9	51.9	51.9	51.9	51.9	69.8	69.8	12.6
Total energy/year		kWh/year	13493.7	13493.7	13493.7	13493.7	13493.7	13493.7	13493.7	13493.7	18147.7	18143.5	3270.8

Total Energy/Year (kWh/yr)	147512
Area (NLA m^2)	19525
kWh/m^2/yr	**7.56**

Note:

1. Lift energy calculated using ISO 25745-2 (2015).
2. The reference cycle energy, idle and standby power are assumed data.
3. Total energy per year based on 5 days week.

This analysis indicates a theoretical energy consumption of 7.6 kWh/m^2/yr. The daily predicted energy consumption of the main group of eight passenger lifts is 8 x 52 = 416 kWh.

However, within the analysis are a number of significant assumptions; reference cycle energy, standby power, and idle power are all assumed for the proposed equipment. This, allied to the fact that the methodology takes no account of group control logic, or the potential benefit of regenerative drives, may serve to make the assessment of limited value, especially when considered in the real-world context of trying to accurately predict actual energy consumed for a building yet to be built.

But accurate prediction is precisely what our industry is being tasked to provide. Recent changes in legislation, combined with a market appetite to provide and occupy demonstrably energy efficient premises, are placing a growing focus on delivering buildings that perform as predicted. Initiatives such as the NABERS scheme and its associated Design for Performance (DfP) process [7] are becoming typical requirements on large commercial office buildings in the UK, and include a requirement to audit the actual real-world energy usage regularly to ensure it remains no more than that predicted. The need therefore to be able to predict energy usage more accurately is coming at us fast.

It therefore seems to the author that we might explore alternate methods of predicting energy consumed by lift systems, perhaps by utilizing existing simulation tools already to hand.

Figure 4 [8] below illustrates an established full day demand profile for a passenger lift and might be an appropriate starting point to define the demand, at least in the current absence of more real-world data from the industry.

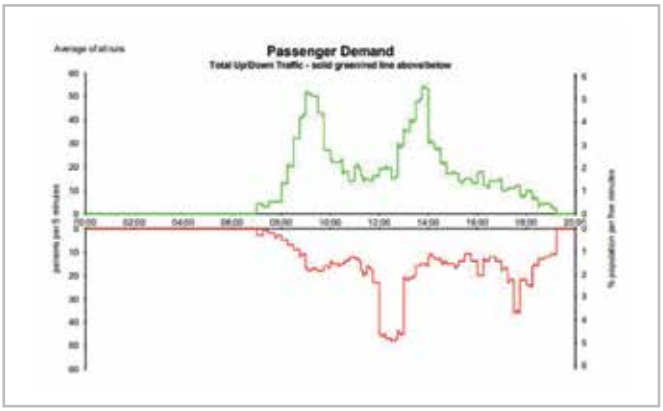

Figure 4 Siikonen Full Day (24-hr) Office Demand Template

Some lift traffic analysis software already contains energy "modules" which model the electrical characteristics of lift equipment. Figure 5 below illustrates an example of such data generated for the eight passenger lifts in this case study and shows predicted kW values for both running and standby modes along with estimates of power requirements under different loads whilst running in different directions. Figures for standby and idle are assumed and typical.

	Car 1	Car 2	Car 3	Car 4	Car 5	Car 6	Car 7	Car 8
kW drive off	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
kW drive on	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
kW 0% load Up	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
kW 25% load Up	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
kW 50% load Up	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
kW 75% load Up	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
kW 100% load Up	27	27	27	27	27	27	27	27
kW 0% load Down	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
kW 25% load Down	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
kW 50% load Down	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
kW 75% load Down	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
kW 100% load Down	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9

Figure 5 Electrical Data Input To Energy Simulation Model

It's of note that some of the running values are negative which on closer inspection indicate the system running in a regenerative capacity, essentially pushing energy back into the system. This is particularly prevalent with a light car running up when the heavier counterweight is overhauling the motor, and with a heavy car running down journey where the heavier car is overhauling the motor.

This approach seems therefore to offer some opportunity in terms of aligning the analyses with a more real-world scenario, especially when one also considers the embedding of this data in a traffic simulation tool which might also account for efficiencies in dispatching that should be inherent in smart control systems such as hall call allocation.

Running the simulation 10 times, each time with a randomized passenger demand pattern, elicits the results shown in Figure 6 below. It is very relevant to note that in building this model, the typical daily population has been set at 70% of the design population; this approach accords with the recommendations set out in NABERS.

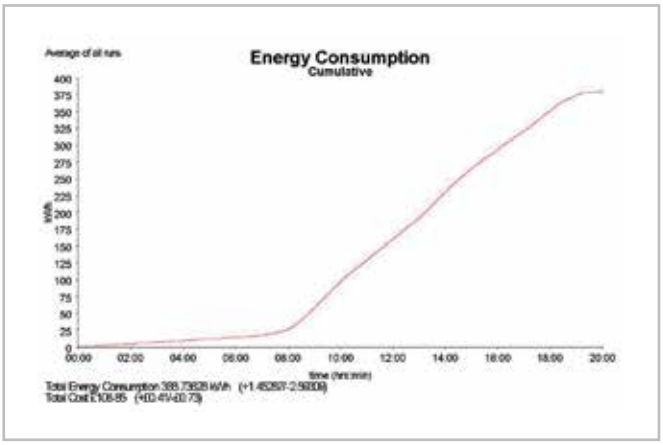

Figure 6 Simulation Model Daily Energy Use

The total daily energy consumption of the eight passenger lifts is modelled to be 389 kWh, a 6.5% reduction on the 416 kWh predicted by the ISO 25745-2 methodology.

If one reviews further the proposed 24-hour demand model it is of note that a significant period of time is spent with no or very low demand, i.e. the lifts are sat stationary in standby or idle mode. The assumed and actual kW rating of standby and idle mode are therefore very significant (particularly in residential applications where the percentage time spent stationary can far exceed that in an office). If one were to adopt a more aggressive assumption in the case study, and model say 150W idle and 200 W standby, the predicted daily energy consumption of the system falls again to 374 kWh, now a 10% reduction from the ISO modelled figure, see Figure 7 below.

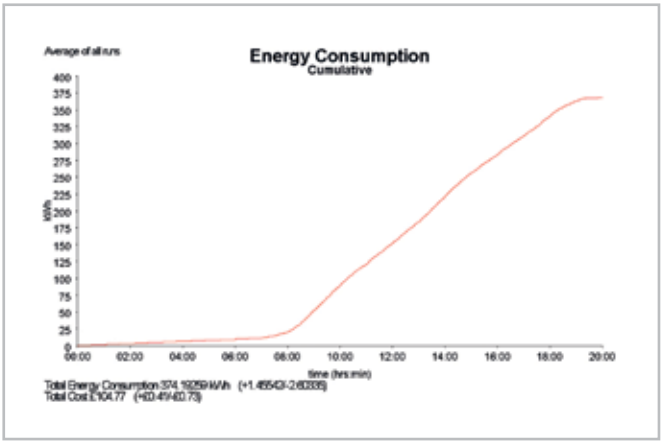

Figure 7 Simulation Model Daily Energy Use (Optimised Standby/Idle)

There is also a growing trend within office design for building amenities, aimed at attracting people back into the office. These amenities have the potential to create additional, disruptive demand on the passenger lifts, and to a lesser extent on the goods lifts. In an ideal energy model this demand would also be simulated however it is common for the type of amenity to be unknown at the time the lift system is being designed, and therefore assessing the potential impact on demand is difficult. It is suggested that in the absence of any more detailed amenity brief, a figure of 5% of the served population should be considered as travelling to and from each of the amenity floor(s) rather than the main lobby level (so called entrance bias). This demand pattern should be considered as coincident with the main morning and lunchtime peaks and modelled in an overlaid fashion to simulate the actual predicted movement of the lifts in response to the prevailing demand. A check should be done to ensure that the generated demand in people / hour is broadly aligned with the area of amenity and the likely population it can safely accommodate, i.e. if the design population limit of an amenity (and this is usually defined by the fire strategy) is 500 people, and the 5% entrance bias is generating 250 people in the lunchtime peak hour, the 5% entrance bias is probably too small and a 10% bias should be tested; if the 5% bias is generating say 450-550 people it is likely to be appropriate.

This approach too however has challenges, not least of which is what demand profile should be modelled as representative of a typical day or week, and how might this profile vary between a front-of-house passenger lift vs. a goods lift, vs. a firefighters lift (all of which form part of the energy model).

Proposing a suitable demand profile for goods lifts is harder as we do not yet have established demand data for such equipment. In the absence of more detailed demand data a constant traffic profile is proposed with demand to and from each floor proportional to the predicted population at the floor. For goods lifts there is likely to be a higher demand in the evenings as the building is cleared of the day's waste, and in the mornings dealing with deliveries. The reader's attention is drawn to a 2018 paper on goods lift demand [9] which provides further guidance on quantifying demand for goods lifts. Separate dedicated firefighters lifts are likely to have very modest demand with only occasional use; they should however be modelled. Amenity demand should be modelled as per the comments above on passenger lifts.

4. CONCLUSIONS & RECOMMENDATIONS

Buildings and the systems within them consume a significant amount of energy and are worthy of rigorous analyses and design development to reduce their WLC footprint. Predicting the energy footprint of lifts is complicated and currently founded on many assumptions and derived information. It would seem a challenge currently to accurately predict a lift's WLC, let alone be able to compare robustly solutions from different suppliers and select the lowest WLC offer.

The interpretation of EPD embodied carbon data is particularly complex and nuanced and needs careful interpretation by experienced practitioners, especially where comparisons are being drawn between two or more lift systems. The EPD process would be greatly assisted if the lift industry could further develop its EPD data and adopt a scalable approach that would allow a representative EPD for say a 1000 kg lift at 1.0 m/s over five stops to be scaled up to accurately represent say a 1600 kg lift at 1.6 m/s over 10 floors. At present energy modelers are forced to select EPD data for the closest lift configuration to that proposed, and this is often a very blunt approach.

Operational energy assessment has an established methodology in ISO 25745-2, however a complementary simulation approach should be developed to further enhance the modelling and represent more complex lift systems and demand profiles. Demand models for ancillary lifts such as goods lifts and firefighters lifts need to be developed and adopted in a consistent fashion. The modelling approach might then also allow the development of energy optimized algorithms in preference to performance optimized algorithms, and the ability to compare the relative benefits of different systems.

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BIOGRAPHICAL DETAILS

Adam J Scott BEng (Hons) CEng FCIBSE MIMechE

Adam started his career in the lift industry 31 years ago with Otis in London, UK. After twelve years working across construction, service, modernization, and new equipment sales, he moved into the world of consultancy with Sweco (formerly Grontmij / Roger Preston & Partners) and has subsequently worked on the design of vertical transportation systems for many landmark buildings around the world.

He is BSi Representative for the CIBSE Lifts Group after four years as Chair and sits on the British Standards Institute MHE4 technical committee. He is also a member of the BCO 2019 vertical transportation technical peer review committee. Adam is currently also the UK nominated expert for WG7 dealing with the accessibility standard EN81-70.

LIFT & ESCALATOR SYMPOSIUM

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LIFT ENERGY MODELLING FOR GREEN BUILDING DESIGN

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Keywords: lift, elevator, energy, environment, simulation, modelling, traffic.

Abstract: Lifts are a relatively minor concern when considering green buildings, yet increasingly they are becoming subject to scrutiny with the drive to net zero. The energy consumption of lifts is a major part of their environmental impact. To reduce that impact, first, we need to improve our understanding and modelling of lift energy consumption. Many attempts have been made to define ways of calculating lift energy consumption. Some are so simplistic that their results are of questionable value. Others are so sophisticated that their widespread application is unlikely other than to specific products. This paper addresses why lift energy modelling is complex and discusses the factors which are most significant. Models based on calculation and traffic simulation are considered. The modelling method proposed addresses the need for considering passenger demand and allows for simple measurement and verification.

1. INTRODUCTION

In 1994 Peters presented a paper at the CIBSE National Conference titled *Green Lifts*? [1] posing the questions, "is there such a thing as a green lift", and "can we design a lift system that delivers good passenger service at an acceptable cost while incurring minimum environmental impact?". At the time there was little interest, but today these questions seem far more relevant and important; although lifts are generally considered a minor contributor to the environmental impact of a building, they are increasingly subject to scrutiny.

The environmental impact of lifts is likely to become even more important as the world builds up, which, perhaps surprisingly is the recommendation of some of the environmental lobby. In "There is no planet B" [2] Berners-Lee writes "The ideal city is compact and easy to get around. The buildings are tall and generally close together".

2. THE ENVIRONMENTAL IMPACTS OF LIFTS

To assess the environmental impact of vertical transportation systems, we first need to have some measure of environmental burdens. A Life Cycle Assessment or Analysis (LCA) is defined as the systematic analysis of the potential environmental impacts of products or services during their entire life cycle. It considers components such as:

- resource extraction of materials for manufacture
- manufacture and installation
- use of the product
- re-cycling and re-use
- waste
- transportation at all stages

A lift LCA presented in 1994 [1] was based on a 4-car group installed in London with a 30-year life and one major refurbishment at 15 years. The analysis suggested that the dominating environmental burdens in the life of this hypothetical lift system were the non-renewable resources depleted, the waste created, and the emissions generated through the production of electricity for the operation of the lifts while in use.

In 2013, Lorente presented her thesis titled *Life Cycle Analysis and Energy Modelling of Lifts* [3]. An extract from her LCA discussion, *Environmental Impacts of Lifts* was presented at the Lift & Escalator Symposium in 2014 [4]. Lorente presents results for a category 3 (medium usage) lift which is reproduced in Figure 1. The Eco 99 scale is an attempt to weigh the importance of environmental impacts based on human health, ecosystem quality and resources [5]. The energy mix assumed is based on 2008 data.

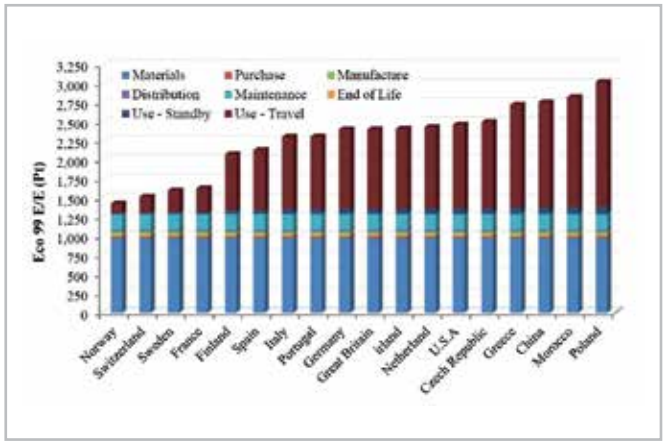

Figure 1 Environmental Impact results (630kg gearless traction) for the usage category 3, installed in different countries

Lorente states that the life expected for the lift and/or its components plays a decisive role in the final environmental impact of the lift. Indeed, for an occasionally used, economy lift with a short life, imported into a country with an "environmentally friendly" energy mix, the dominating environmental burdens are not going to arise from the electricity consumed in use. But they are still significant.

3. HOW A LIFT USES ENERGY IN SERVICE

3.1. THE IDEAL SCENARIO

Al-Sharif, Peters, and Smith [6] explain that in an ideal world, with no friction and losses, energy is never consumed by a lift, it is borrowed and then returned. Consider the morning in an office building with a full car travelling up from the ground floor. Part of the electrical energy supplied is converted into kinetic energy as the lift accelerates and is given back when the lift decelerates. The other part is given to the passengers as potential energy, see Figure 2. The potential energy is returned when the passengers travel back to the ground floor, see Figure 3.

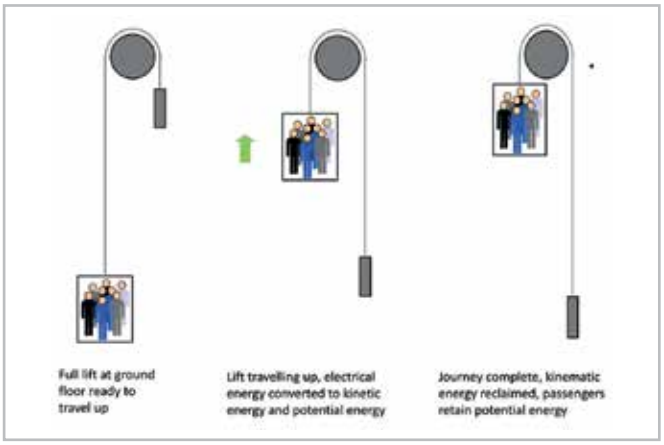

Figure 2 Example ideal lift energy transfer for up journey

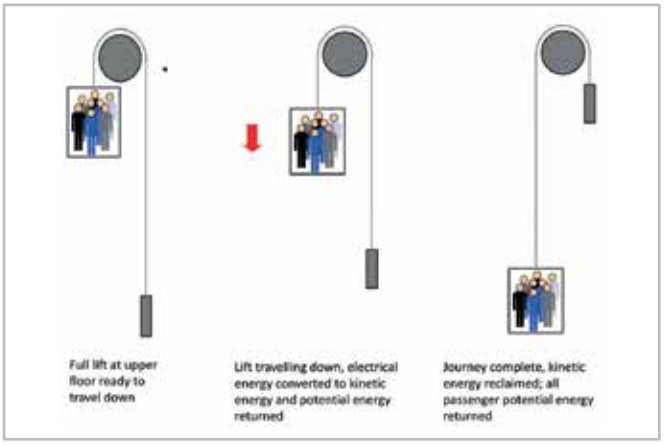

Figure 3 Example ideal lift energy transfer for down journey

3.2. A REAL SCENARIO

Consider an up journey with a measured speed profile as given in Figure 4.

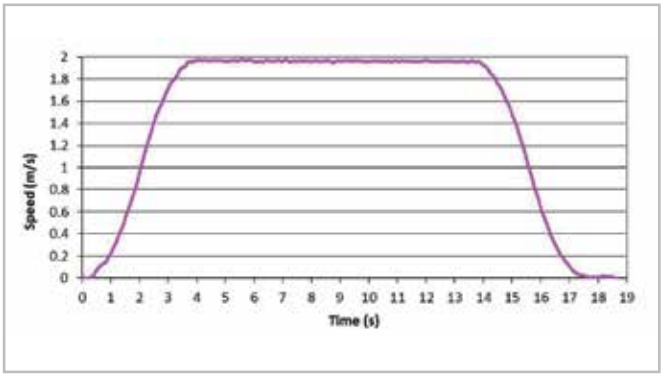

Figure 4 Measured speed profile

The energy consumption of a loaded car travelling up was measured as shown in Figure 5 [6]. Travelling up, the lift reaches full speed after approximately 4 seconds. Once at full speed, it draws a relatively constant 30 kW until it starts to decelerate. The energy consumed is 0.11 kWh. The energy consumed by the same loaded car travelling down was measured as shown in Figure 6. As this is a regenerative drive, during part of the trip energy is being reclaimed, a total of 0.04 kWh. Unlike the ideal scenario represented by Figure 2 and Figure 3, we have losses; to transport these passengers up and then down the building cost us 0.11 kWh – 0.04 kWh = 0.07 kWh.

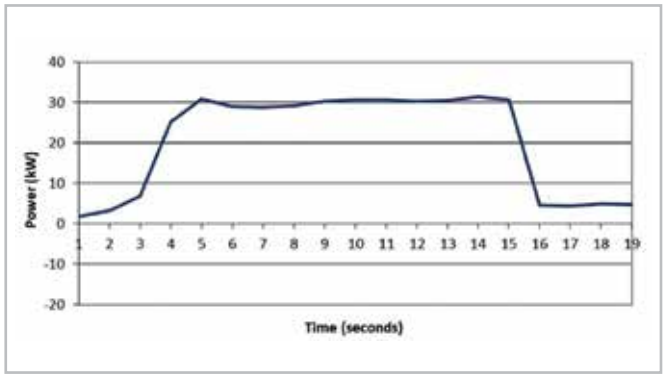

Figure 5 Energy consumption of loaded car travelling up

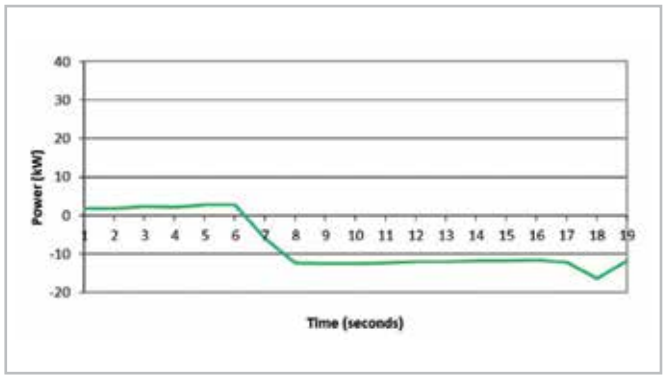

Figure 6 Energy consumption of loaded car travelling down

3.3. FOUR QUADRANT OPERATION

A lift is said to operate in four quadrants, as shown in Figure 7. When a lift leaves the ground floor full of passengers, it is motoring, requiring predominantly positive torque (T) in a positive direction. As passengers are dropped off up the building, the counterweight becomes heavier than the lift, so the motor is providing predominantly negative torque in a positive direction. Similarly for a journey down the building, in a negative direction, the motor can be required to deliver both positive and negative torque.

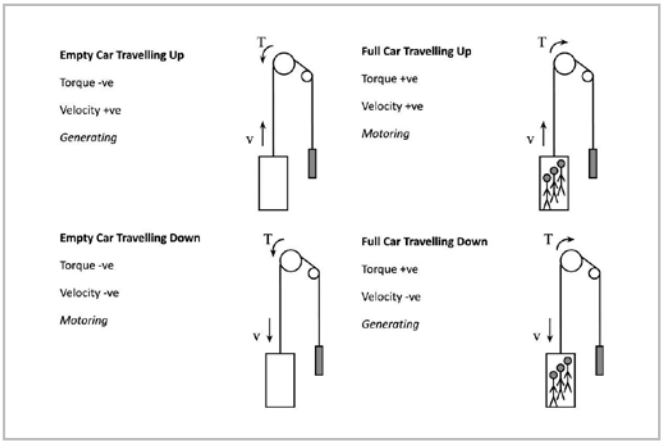

Figure 7 Four quadrant operation of a lift drive

To capture the energy consumption across these four quadrants, Al-Sharif, Peters, and Smith [6] measured the energy consumption across a range of loading in the up and down directions, see Figure 8. Note that when the car is part loaded the mass of the car plus passengers is closer to the mass of the counterweight; in this case, the energy consumption when up to full speed is less, and the peaks (and troughs) at the beginning (and end) of the trip are more marked as the kinetic energy component is more dominant.

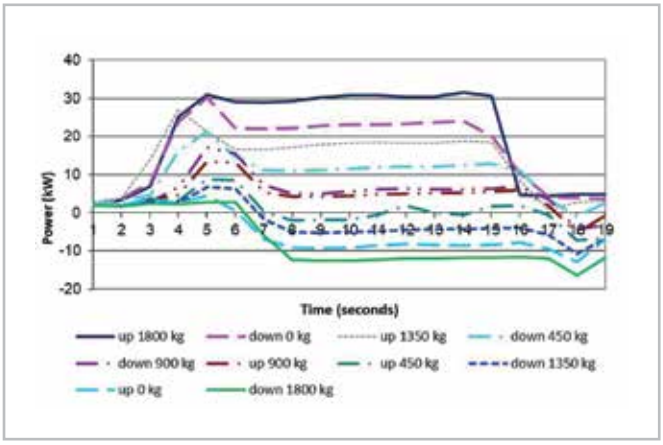

Figure 8 Energy consumption of car travelling up and down for a range of loads

3.4. NON REGENERATIVE DRIVES

If the lift drive is not regenerative, then no energy is reclaimed. The best-case equivalent of this is Figure 9. To transport these passengers up and then down the building now cost us 0.11 kWh + 0.00 kWh = 0.11 kWh rather than 0.07 kWh.

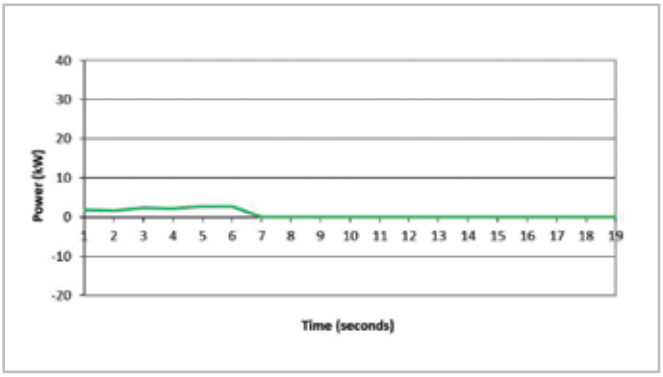

Figure 9 Energy consumption of loaded car travelling down without regeneration

3.5. ENERGY CONSUMPTION WHEN IDLE

Most of the time a lift is idle because there are no calls to serve, or passengers are loading/unloading. The power consumption while idle is crucial. Our measurements have ranged from under 100W to over 2 kW.

3.6. PASSENGER DEMAND

Two identical lift groups in two identical buildings will consume different amounts of energy. This is because it is the passengers who create the calls which are allocated by the dispatcher to the lift, resulting in individual lift journeys carrying different numbers of people. The number of trips, direction and car loading for the trips is determined by the passenger demand and the dispatcher allocating individual passengers to lifts.

4. ENERGY MODELS

MANY ATTEMPTS HAVE BEEN MADE TO DEFINE WAYS OF CALCULATING LIFT ENERGY CONSUMPTION. A COMPREHENSIVE REVIEW OF THESE IS PROVIDED BY LORENTE IN HER DOCTORAL THESIS [3]. SHE REVIEWS METHODS LISTED AS:

1. Schroeder
2. Doolard
3. CIBSE Guide D Version 2005 & 2010
4. Al-Sharif-Peters-Smith
5. Barney (a) and (b)
6. Hong Kong Code of Practice
7. Swiss Study
8. Comunidad de Madrid
9. VDI 4707 Part 1
10. VDI 4707 Part 2
11. ISO TC178 WG10 (ISO/FDIS 25 745 -1) – First Draft
12. ISO TC178 WG10 (ISO/FDIS 25 745 -1) – Second Draft
13. E4 Project
14. Lindegger
15. Kone
16. Empirical calculation

Lorente comments that some methodologies make their assessment based on a measurement or calculation process including a single round trip (2, 5a, 6, 8). They are only appropriate for making general recommendations. Other methods (1, 3, 7, 9, 10, 11, 12, 13, 14) aim at rating the performance of the product operating in a certain building; this can be done in a simplified manner or by considering usage patterns or usage category tables.

For example, the Schroeder method (1), proposes an energy calculation based on the formulae:

$$E_d = \frac{R \times ST \times TP}{3600}$$

Where E_d is the daily energy consumed (kWh/day), R is the motor rating (kW) and ST is the number of starts per day.

CIBSE Guide D (2000) compared the Doolard (2), and Schroeder (1) methods, concluding that they were inconsistent by almost a factor of two; the simplifications required to reduce the energy estimate to a simple method yield only rule-of-thumb results when it comes to energy consumption.

The empirical calculations (16) reviewed were based on a survey of lift consumption collected in conjunction with a questionnaire asking a variety of technical and operational questions. An equation was developed which linked the energy use to the lift drive technology and building size. The authors acknowledge that the formulae will not work other than for the buildings surveyed.

Improving on these methods, Barney and Lorente ran thousands of simulations [7] to build formulae and tables which are claimed [8] to be the most accurate public domain energy model. They are probably correct. The work is now applied in ISO 25745-2: 2015 [9].

Nevertheless, the most accurate methods (4, 5b, 15) recognize the importance of traffic and passenger handling strategies, linking their models directly with traffic simulation programs.

The model developed by Al-Sharif, Peters, and Smith [6] is acknowledged by Lorente as the most accurate model available [3]. It models every passenger journey and corresponding lift trip such that the energy consumed can be calculated on a trip-by-trip basis. A mathematical model of the lift energy consumption was developed which could be calibrated to a specific installation, for example, the measurements given in Figure 8, after calibration yield a set of power consumption curves for all four quadrants, as illustrated in Figure 10. The mathematical model then allows for any trip length and car loading, up and down. This trip-based model will provide the most accurate results if calibrated correctly and if the traffic is known. It is patented by the client it was developed for [10] so is not available in the public domain.

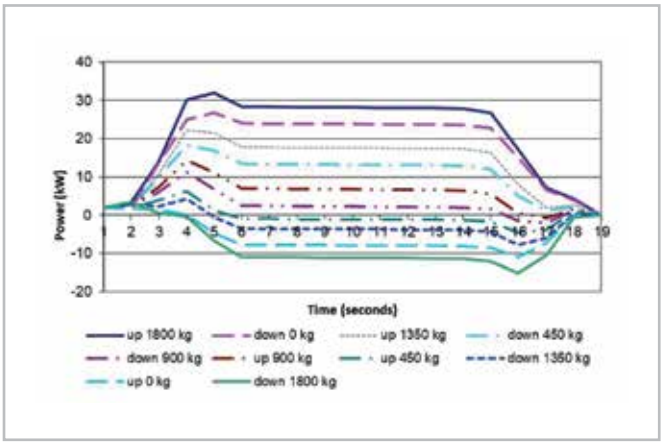

Figure 10 Energy consumption of car travelling up and down for a range of load applying model by Al-Sharif, Peters, and Smith

To offer a simpler model accounting for traffic and passenger handling strategies, one simulation package [11] offers a simple on/off model for the drive at different directions and loads. The equivalent power consumptions curves in Figure 10 become Figure 11.

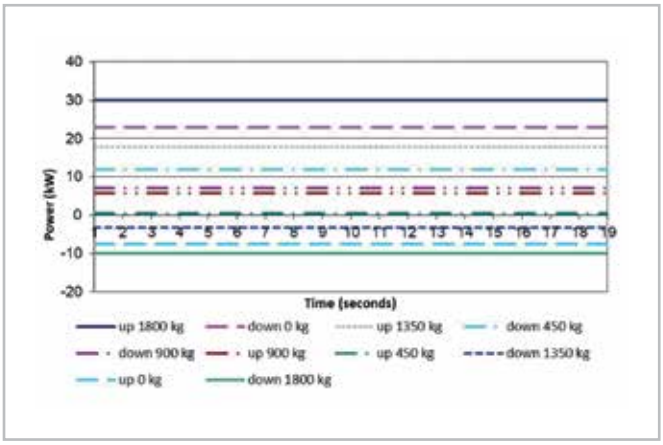

Figure 11 On/off energy consumption model

This approach overestimates the power consumption while the lift is accelerating and decelerating. A better approximation would be, at the beginning of the trip while the lift is accelerating, to draw a straight line from 0 to the power consumption at full speed. And, as the lift is decelerating, another straight line from the power consumption at full speed to 0. The approximation at the beginning of the trip will be an underestimate as we are drawing power to give the system kinetic energy. But that underestimate will be mostly corrected by the overestimate at the end of the trip as the kinetic energy is reclaimed, see Figure 12.

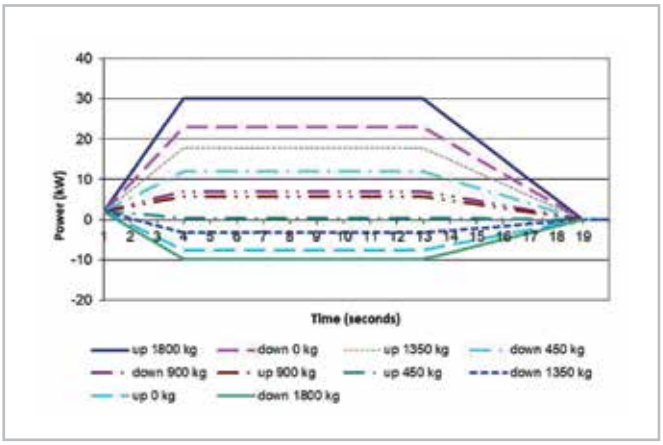

Figure 12 On/off energy consumption model with beginning and end of trip set to 0

This approach provides a trip energy consumption which compares favorably with the more complex model.

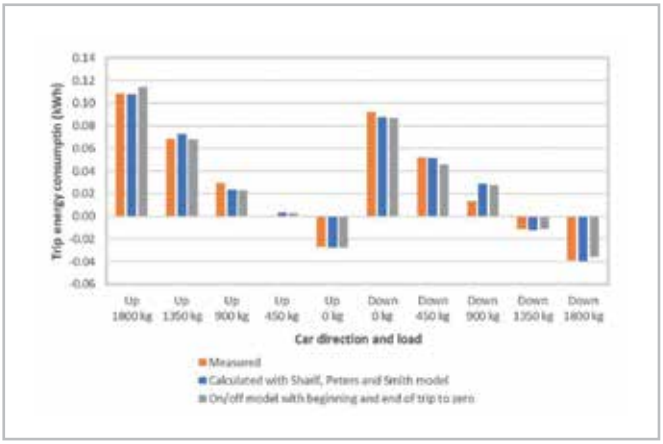

Figure 13 Comparison between measured energy consumption, complex and simplified models

5. CONCLUSIONS

Anyone denying climate change or the importance of reducing our carbon emissions would rightly be considered the modern-day equivalent of a flat-earther. The environmental impact of lifts is not solely due to the energy they consume, but it is a major component. As the climate crisis heightens, buildings get taller and energy prices soar, understanding the energy consumption of lifts becomes increasingly important. If we understand and measure lift energy consumption, we are in a better position to assess improved lift solutions.

Energy modelling of lift systems is complex. There have been excellent attempts to provide formulae and table-based estimates of lift system energy consumption. Without access to a simulation model, the most authoritative of these is presented in ISO 25745-2 [9]. However, without considering all-day passenger demand profiles and the impact of traffic control systems, even the ISO method will only ever offer a rule of thumb estimate of energy consumption.

Applied with simulation, advanced models [6] do offer accurate modelling of individual lift trips. The contribution of this paper is to offer a simpler approach. In the example presented, little accuracy is lost with the proposed simplification. The simpler model proposed in this paper provides a pragmatic, public domain solution which is easier to calibrate and apply in any simulation software.

The final challenge remaining is calibration. For this, the industry needs to collect "big data" on passenger demand and energy consumption and make it available in the public domain. This is technically possible to do and should not need to add major costs if specified early on new projects.

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FEASIBILITY OF AN ENERGY EFFICIENT FUEL CELL HYBRID LIFT: THE MAIN CONCEPT AND DESIGN

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Keywords: regenerative, reversible, fuel cell, hydrogen, solar panels, hybrid elevator, hybrid lift.

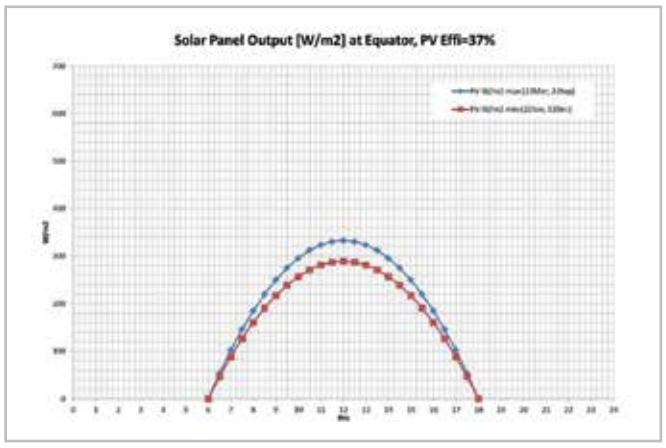
Abstract: The latest progress in Fuel Cell (FC) technologies have led to rapid developments in ground vehicle transportation. These technologies could also be considered for deployment in vertical transportation (VT) systems. This paper presents a feasibility study concerning the application of a reversible fuel cell power supply for a solar panel powered lift system operating in a high-rise building. It is assumed that all energy needed to power the elevator system will originate from the solar panels. Energy needed for operation at the low-irradiation periods will be generated from the Hydrogen stored in medium-pressure tanks. The Hydrogen will be produced in a Unitized Reversible Fuel Cell (URFC). When the Grid access is possible the grid will provide emergency power for peak operations or for longer periods of low solar panels output. The URFC unit shall operate in a tandem with a lithium-ion battery, while the size of URFC and battery shall be optimized for overall system minimum cost. The overall conclusion is that the grid-independent lift energy supply system is possible, however the cost and space requirements are major limitations in the seasonal energy storage in Hydrogen form.

1. INTRODUCTION

In the modern high-rise built environment electric motor driven traction elevators are applied for efficient Vertical Transportation (VT) of people and goods. In the traditional system the power to the electric motor is provided by the public mains supply (grid). When the system is raising the out of balance load in the car or in the counterweight the power is taken from the grid. Part of the supplied energy is then stored in the mechanical system as potential energy. On the other hand, when the system is lowering the out of balance in the car or the out of balance of the counterweight the potential energy is being returned to the drive system. This returned energy is referred to as 'regenerated'. Thus, the elevator drive is capable of transferring energy in both directions and is termed as 'reversible' [1].

The recent progress in Fuel Cell (FC) technologies have led to rapid developments in ground vehicle transportation. This paper presents the results of a study concerning the feasibility of a reversible fuel cell power supply system for solar panel powered lift operating in a high-rise building. It is assumed that all energy needed to power the elevator system will originate from the solar panels. Two geographic locations are considered: the best possible solar irradiation in Kampala (Equator) and mid-Europe 52° N parallel (London). The solar irradiation [W/m^2] curves have been derived from available data [2] and are shown in Fig. 1.

In both cases the lift daily energy needs are balanced with the energy stored in a buffer battery set, which has to satisfy two main requirements: store enough energy for daily operations (with reasonable margin for the cloudy weather) and the capability of charge/discharge current at peak power periods (e.g. motor start power, break energy accumulation).



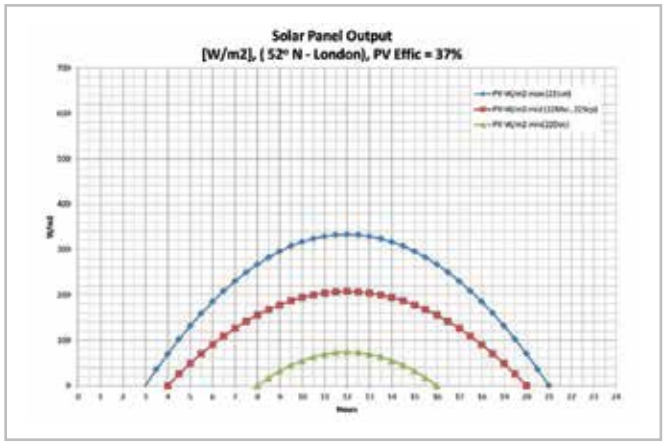


Figure 1 Solar power seasonal fluctuations

2. ENERGY REQUIREMENTS

A simplified model of high-rise lift installation has been considered to generate the lift power requirements and energy consumption. The corresponding building data and the lift installation parameters are shown in Table 1. The lift energy simulation model implemented in a commercial simulation software package Elevate™ [3] has been used to determine the lift power requirements and energy consumption. Siikonen full day office template was used to generate the passenger demand data [4] (see Fig. 2).

Fig. 3 illustrates the simulated cumulative energy consumption data and Fig. 4 shows the averaged power requirements. The lift energy requirements over time is then derived from the cumulative energy data and the corresponding curve is shown in Fig. 5.

The available Sun energy depends on the daily and seasonal irradiation fluctuations. Different energy storage strategies have been adopted to adapt the lift operation scenarios to these cases.

Table 1 Main model data

Parameters	Unit	Value
Building:		
Total building height	[m]	112.4
Average floor height	[m]	3.75
Number of floors		30
Total resident population		300
Average population/floor		10
Lift installation:		
Number of lifts		1
Rated load	[kg]	1600
Car area	[m^2]	2.84
Door open time	[s]	1.8
Door close time	[s]	2.9
Rated speed	[m/s]	5.0
Acceleration	[m/s^2]	1.0
Jerk	[m/s^3]	1.4

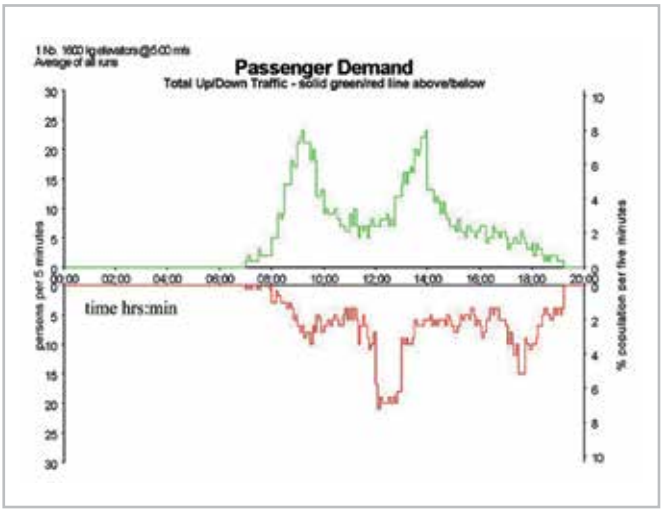


Figure 2 Siikonen full day office passenger demand curves

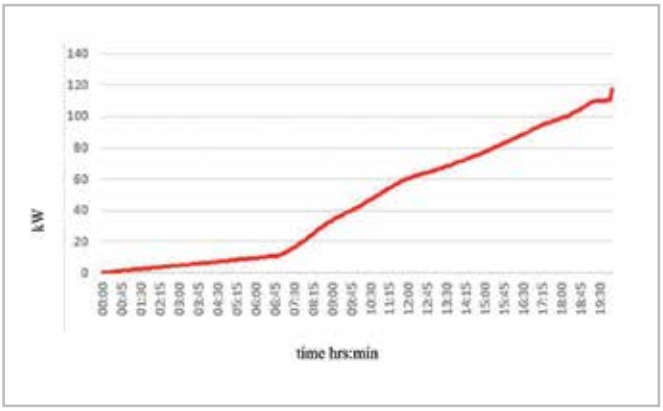


Figure 3 Cumulative energy consumption

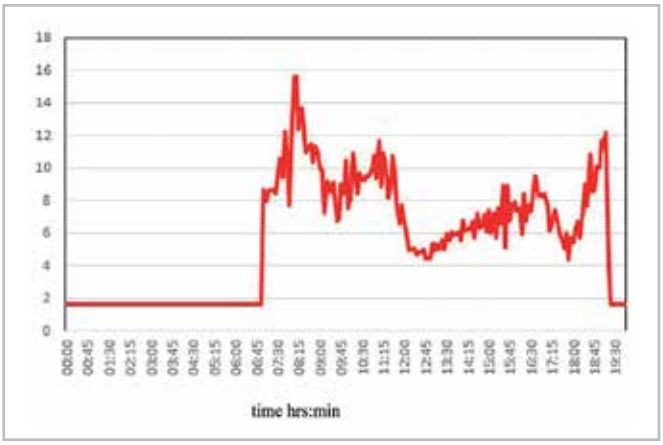


Figure 4 Averaged power requirements

THESE SCENARIOS ARE OUTLINED AS FOLLOWS.

A) The energy required is balanced with the energy stored in a daily buffer battery sized for the available Sun energy on:

a. 22 June at the Equator location

b. 22Sep at the 52oN location

It is considered that the seasonal energy imbalances/ fluctuations can be covered in the following ways

B) The Grid access is possible

a. The Sun excess energy is stored in the grid at times when the excess energy occurs

b. The Lift energy deficits are covered from the grid at times when the Sun energy is inadequate

C) The Grid access is not possible

a. The Sun excess energy is stored in the seasonal battery bank when the excess energy occurs, while the energy deficits are covered from the battery bank when the Sun energy is not adequate

b. The Sun Excess energy is stored in the Hydrogen gas generated (Water Electrolysis) when the excess energy occurs, while the energy deficits are covered from the Fuel Cell operations through Hydrogen conversion into electricity.

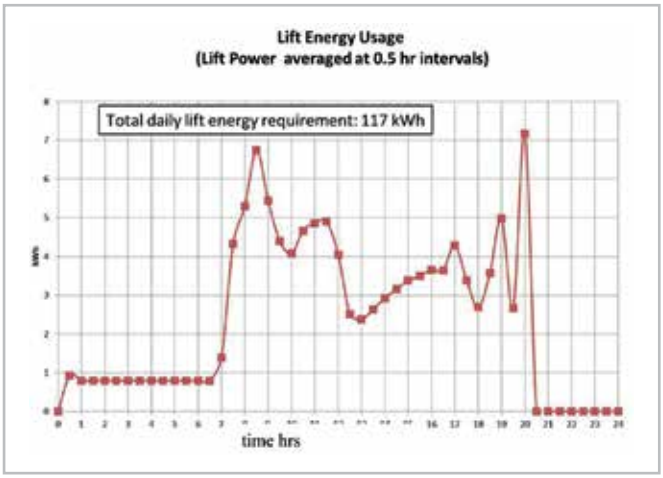


Figure 5 Lift energy consumption

3. POWER SUPPLY SYSTEMS FOR ENERGY STORAGE STRATEGIES

Considering the seasonal energy imbalance/ fluctuations the following lift power supply systems are considered. The diagrams in Fig. 6 and Fig. 7 illustrate the power supply system for scenario B and scenario C, respectively. It should be noted that the diagram in Fig. 7 covers two cases: C)a and C)b, respectively.

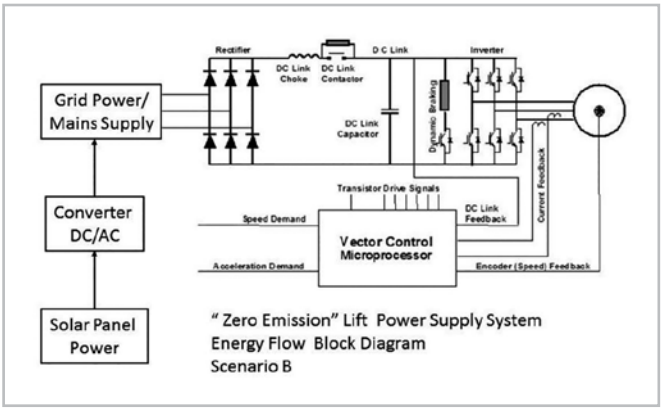


Figure 6 Energy Flow Block Diagram – Scenario B

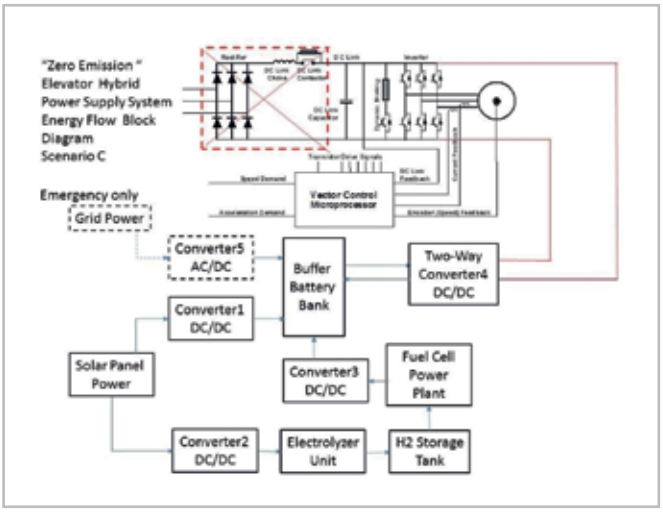


Figure 7 Energy Flow Block Diagram – Scenario C

The Case C)a can be realized when the Fuel Cell/ Electrolyser loop is omitted and when the Buffer Battery Bank size is increased to cover the seasonal Sun power fluctuations.

4. BUFFER BATTERY SIZE – DAILY ENERGY FLUCTUATIONS

4.1 BATTERY SIZE FOR DAILY LIFT OPERATIONS

Considering that the lift power requirements don't correspond to the available Sun energy periods (e.g. day-night) the buffering battery bank is proposed. In this scenario the battery is sized for charging from photovoltaics (PV) solar panels to cover the daily lift energy requirement. The minimum required battery size for daily operations is estimated at 79 [kWh] based on the data shown in Fig. 8 (assuming 100% capacity margin for a "cloudy" day). It should be noted that the lift power requirement is related to the unit area (1m2) of PV panels.

The diagram in Fig. 8 presents the comparison of the Sun's available energy on the minimum energy day (area below the red line) with the lift's daily energy requirement (area below the purple line) for locations near the Equator. Sizing PV panels for the minimum energy day is likely to result in a cheaper solution than sizing the PV panels between the blue and red lines and installing any seasonal energy fluctuation compensation device.

For locations near the 52oN parallel the situation is dramatically different. By comparing the graphs in Fig. 1 it becomes clear that the PV panel surface would need to be very large in order to cover the daily lift power requirement on the minimum Sun energy day (22 Dec) –green line, bottom graph. In this case a seasonal energy fluctuations compensation device will likely be required, while the PV panels would be sized to match the annual energy requirement need.

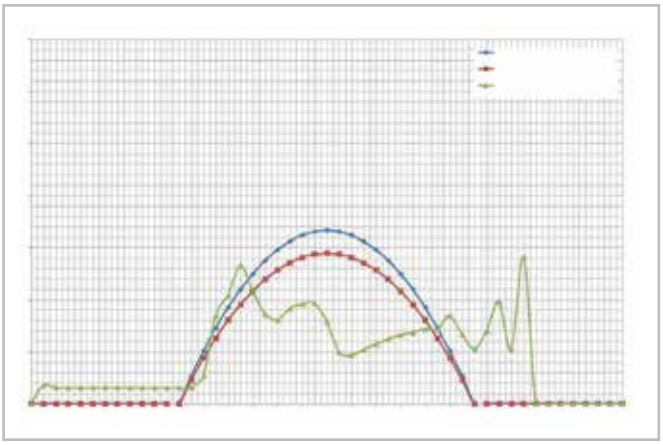


Figure 8 Lift daily energy requirement balanced with PV daily energy on 22 Jun at equator

4.2 BATTERY SIZE FOR LIFT MAXIMUM POWER OPERATIONS

The battery size is also linked to the load power and charge current limitation. A typical 3C Li-Ion battery's current limitation is 300 [A]. For the selected 100 [Ah], 12 V battery and 165 [kW] peak lift power the minimum buffer battery size is 55 [kWh].

Comparing the battery sizes from cases 4.1 and 4.2, the 79 [kWh] battery bank size is suitable to cover both the daily Sun power fluctuations and the battery charge current requirements.

5. PV PANELS SIZE AND BUFFER BATTERY SIZE

5.1 PV PANELS SIZE FOR OPERATIONS NEAR THE EQUATOR

The required PV panels surface area for operations near the Equator is determined to be 51 m2 assuming the PV conversion efficiency at 37%. The comparison of major component costs is provided in Table 2. There will be no need for the seasonal energy storage – see the maximum (blue) and minimum (red) irradiation curves in Fig. 8.

5.2 BUFFER BATTERY SIZE – SEASONAL ENERGY FLUCTUATIONS (52°N)

One of the seasonal energy storage options is to use the battery bank. The required battery capacity calculations that have been carried out indicate that this option is not a plausible solution – the energy storage would require 9,906 batteries of 100 Ah each, while the PV Panel surface area would be 50 m2. The cost of batteries would then be of about USD 2,000,000.

6. H2 STORAGE AND FUEL CELL SIZE – SEASONAL ENERGY FLUCTUATIONS (52°N)

Some other seasonal energy storage option is the Electrolyser-H2 Storage-Fuel Cell Power System. The main system components are presented in Fig. 7. The operating strategy involves harvesting the Sun energy during high-irradiation periods, converting it into Hydrogen through water Electrolysis, storing Hydrogen in pressurized tanks and converting the Hydrogen back to electricity in the Fuel Cell at the low-irradiation periods. The Electrolysis/Fuel Cell round trip efficiency is around 45 % which impacts on the required PV panel size/ surface area during the high-irradiation energy harvesting. In this case the needed PV panel surface area is determined as 80 m2.

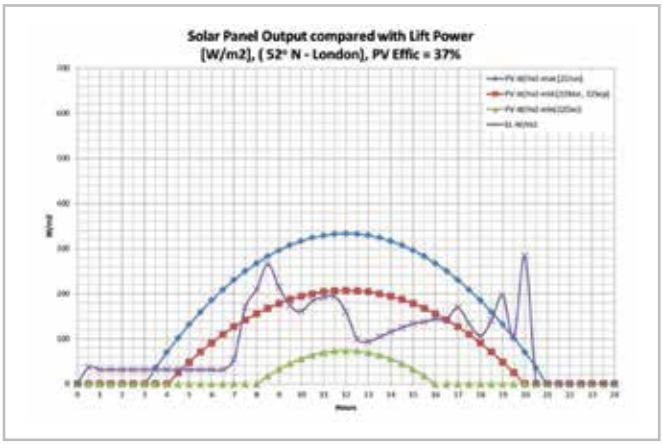


Figure 9 PV Panel Output compared with daily lift power need (PV Panels sized for energy harvesting between 22 March and 22 September)

It should be noted that the lift power requirement is per the unit area (1m2) of PV panels. The required Hydrogen amount for energy storage is 7,925 [Nm3]. The maximum H2 storage pressure is 130 [barg] due to the Electrolysis process limitations [5]. However, at this point only prototypes of such Electrolysers are available. But bearing in mind the rapid progress in FC technology it can be assumed that the commercial 130 [barg] electrolysers will be available soon and that the high-pressure H2 compressors will not have to be used due to their high cost.

The required H2 tanks volume (to store water) is 66 m3, which might be not practical for installation in the high-rise building. The cost of tanks would exceed USD100,000. The cost of 4 [Nm3/hr], 30 [barg] PEM Electrolyser is around USD200,000. The cost of Fuel Cell for H2 conversion is comparable to the PEM Electrolyser cost.

The Unitized Reversible Fuel Cell technology, which combines Electrolyser and Fuel Cell in one device, is in the prototyping stage and once developed it might cut the H2 conversion hardware cost by 50%.

Assuming that the required advanced technology is commercially available today, the cost of H2 production infrastructure would exceed USD 300,000.

7. CONCLUSION

A comparison of the scenarios considered in this study is presented in Table 2. Two geographic locations have been considered in the analysis: near the Equator and at 51oN, which corresponds to London location.

The analysis carried out shows that there is no need for the seasonal energy storage in the areas close to the Equator due to the high solar power availability through the entire year. The daily energy balancing can be covered with a battery pack which is much cheaper than the Electrolyser-Fuel Cell system of the comparable energy storage capacity (USD 25,000 vs USD 200,000), refer to the cases A)a; B)-C), respectively. The need for seasonal energy storage arises at the locations away from the Equator. The simplest and most cost-effective way to deal with the seasonal energy storage in these locations is the Grid energy storage (see the case A)b; B, respectively).

When the Grid energy storage is not available (case A)b; C)a and C)b.), the cheaper solution is Energy Storage in Hydrogen rather than in Li-hydrate Battery, however, the size of H2 storage tanks (66 m3) might result in safety concerns if located near a high rise building. Considering 2 m diameter tanks the total length of tanks would be about 21 m.

A careful layout planning will be required if such solution is adopted, assuming that the high cost is not an issue. Seasonal energy storage in a Battery Pack is the most expensive of all considered scenarios. It is relatively safe, but still requires considerable amount of real estate space to house the batteries. The expected battery mass is 214 tons while the battery storage volume would be around 200 m3, including the space for connections and cooling.

The overall conclusion is that the grid-independent lift energy supply system is possible, however the cost and space requirements are major limitations in the seasonal energy storage in Hydrogen form.

It should also be noted that there are hazards associated with the application of fuel cell technology in the built environment. The main hazards involved are related to the hazardous properties of hydrogen and its storage [6]. The hazards include fire and explosion as well as electrical hazards. Therefore, controlling the risks involved need to be considered.

Table 2 Comparison of Scenarios

Category	Unit	Scenarios			
		A)-a. Equator Locations	A)-b. 52°N Locations		
		B)-C) No Grid Storage Required	B) Grid Storage Possible	C) Grid Storage Not Possible	
				a. Energy in Battery	b. Energy in H2
Technical Data					
Lift Peak Power	[kW]	165	165	165	165
Buffer Battery Size	[kWh]	79	79	10698	79
PV Panels Total Surface	[m2]	51	63	63	80
H2 Storage Size (130 bar)	[m3]	NA	NA	NA	66
H2 Production/Conversion Hardware (Reversible Fuel Cell - projection)	[kW]	NA	NA	NA	24
Cost Estimate					
Buffer Battery Cost	[USD]	14,103	14,103	>2 mln	14,103
PV Panels Cost (@ $0.65/W)	[USD]	10,988	13,556	13,556	17,220
H2 Storage Cost	[USD]	NA	NA	NA	>100,000
H2 Production/Conversion Hardware Cost	[USD]	NA	NA	NA	>200,000
Total Cost Estimate	[USD]	25,091	27,659	>2 mln	>300,000

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BIOGRAPHICAL DETAILS

Dr Stefan Kaczmarczyk is Professor of Applied Mechanics and Postgraduate Programme Leader for Lift Engineering at the University of Northampton, UK. His expertise is in the area of applied dynamics and vibration with particular applications to vertical transportation and material handling systems. He has published over 100 journal and international conference papers in this field. He is a Chartered Engineer, elected Fellow of the Institution of Mechanical Engineers and a Fellow of the Higher Education Academy.

Dr Janusz Blaszczyk is a Mechanical and Power Engineering graduate. For the past 40 years he was developing and improving technologies and products related to power generation and alternative energy: thermal processes (heat exchange & combustion), internal combustion engines, steam power boilers and fuel cell power units for various applications - automotive engines, backup power units, portable power units and auxiliary power units. His functions and positions included: Research Development Engineer, Product Development Engineer, Performance Engineer, Process Engineer, Lecturer (Thermal Subjects), Project/Program Manager, Product Development Technical Leader, Functional Manager – Mechanical Engineering, Principal Applied Scientist and Chief of Engineering. Dr Blaszczyk spent 17 years in academia environment lecturing at Silesian Technical University (Poland), University of Zimbabwe (Zimbabwe) and University of British Columbia (Canada). His recent career years were devoted to the new technologies development while working for Utility & Recovery Engineering Ltd. (Canada), Ballard Power Systems Inc. (Canada), PowerCell Ltd. (Volvo subsidiary, Sweden) and Shanghai Everpower Technologies Ltd. (China). Dr. Blaszczyk have overseen entire lifecycle of new product development – from conceptualization and R&D, through prototyping and testing to transfer for production.

Dr H. Lei Mr. gained his Ph.D. degree in Power Electronics from the Zhejiang University in China. He has twenty years of research and development experience, including outstanding achievements related to the development of "multi-frequency power converter topology and control" and"1-2kW UPS digital control" electronic boards. Dr. Hu Lei has worked several years as a team leader at the Fuel Cell Division at Samsung, accomplishing "2W passive Fuel Cell charger system for a cellphone "and "25W portable Fuel Cell Power Supply" for military application. Recently Dr. Hu Lei has been promoted to the position of Director of Transportation Division at Shanghai Everpower Technologies, Ltd.

Dr Rory Smith has over 49 years of experience in all aspects of the lift industry including sales, installation, maintenance, manufacturing, engineering, research & development. He has worked for ThyssenKrupp Elevator for the last 23 years. Prior to becoming involved in ThyssenKrupp's Internet of Things, he was Operations Director, ThyssenKrupp Elevator Middle East. His scientific interests include, operations management, high rise - high speed technology, ride quality, traffic analysis, dispatching. To date he has been awarded numerous patents in these areas and has many pending patents.

CAN YOU HELP THE SAMARITANS IN MANCHESTER

John Bentley at LECS recently took a call from the wonderful Samaritans in Manchester and after a site visit this is an appeal to the industry for investment by means of components, expertise and where required labour. Our aim is to restore a safe and reliable service to The Samaritans building (which they own) and to demonstrate that the Lift Industry can work together and to put something back into the country's foremost mental health charity.

John and LECS are working with Mark Harding and the Lift Industry Mental Health Charter on this critical appeal for support.

THE PROJECT:
We have an 1993 8 person/630Kg hydraulic passenger lift; 4 stops; single entry; Selcom two panel side opening doors; Electra Vitoria control panel (1993); Electrohidraulica tank, pump and motor with a Blain Valve block; Original EV 'TV' style landing and car fixtures.

The site visit showed that the lift is really only suitable for a skip… so we have compiled a list of components we are looking to secure and also any assistance your company may wish to offer in ensuring this project restores the lift to a safe and reliable condition. It is our intention to present the finished product as a joint venture from The Lift Industry. We hope to commence the work from early May and complete by end of June. We already have some commitments for labour and ongoing maintenance on completion.

We are open to any offers of assistance, especially with regard to the major components.

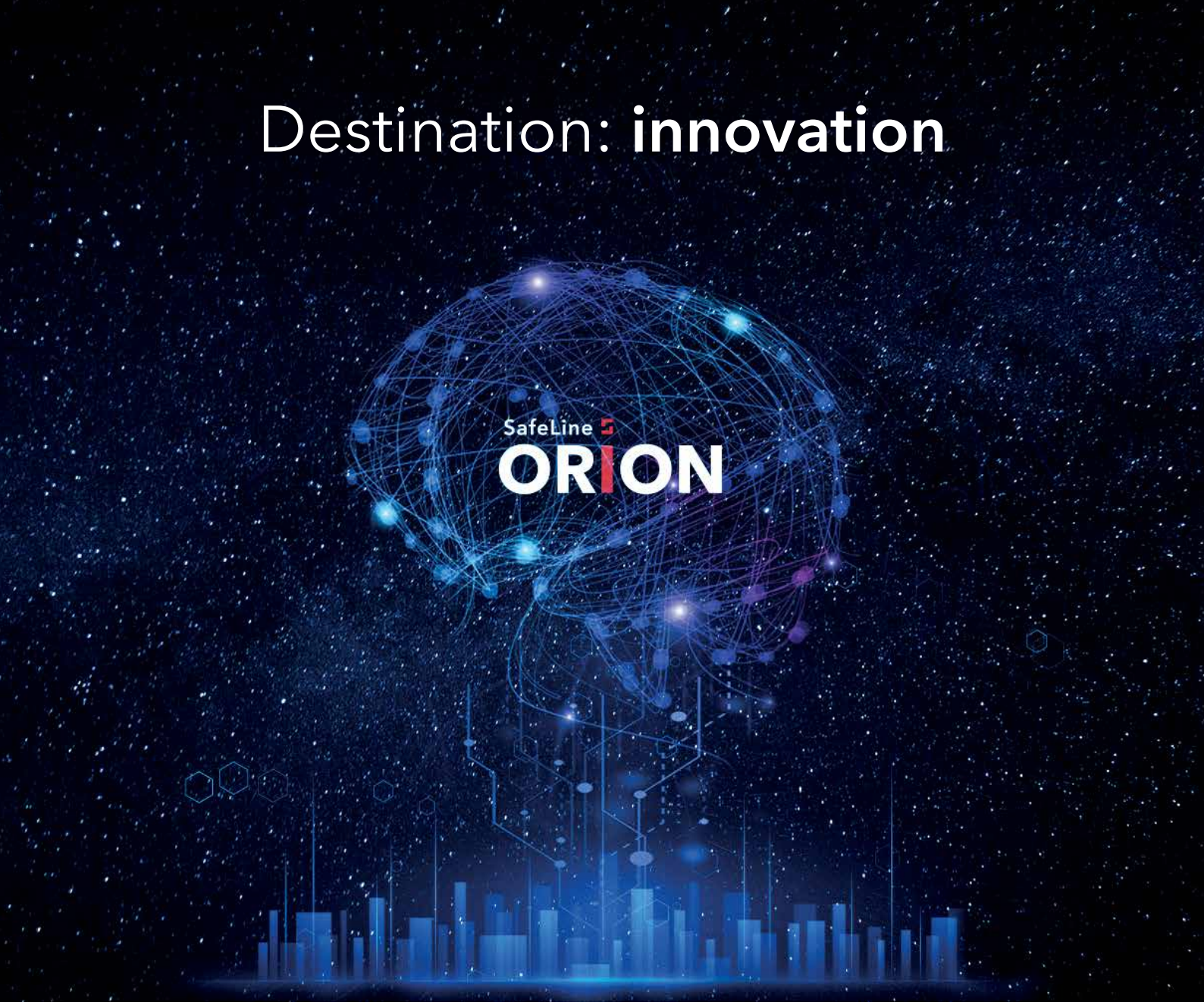
Our wish list is:

- Control Panel & Shaft switch kit
- Tank & Power Unit
- Hydraulic Oil & Ram seals
- Car top control unit
- Selcom Door operator conversion kit (Hydra Arm to a Hydrabelt mod kit)
- Selcom air cords, door rollers & door shoes
- Safety edge kit
- Landing pushes & indicators (4 stop simplex)
- Car operating panel; pushes, indicators (4 floors, alarm, DO, key switches, AL)
- Auto-dial unit inc pictograms and inductive loop
- GSM unit
- Trailing cables and shaft wiring including trunking and tubing
- Suspension ropes and fittings
- Shaft lighting LED kit
- Pit ladder
- Pit prop
- Polyurethane buffers
- Safety signage pack
- LED car lighting unit
- Vinyl wrap for the doors and car interior (nice to have)
- Paint!!

If your company can assist with any of the above we would be extremely grateful. Full technical detail of the requirements will be given as we receive responses. We will publicise the progress but we must emphasise this intended to be a joint gesture from The Lift Industry.

Please contact: **John Bentley**
Email: ***john.bentley@lecsuk.co.uk***
Mobile: **07968 764414**

Destination: **innovation**



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PROVIDING THE ZEST TO TAKE YOUR CUSTOMER SERVICE TO THE NEXT LEVEL

Who would you want to be stuck in a lift with? It's a classic party question that usually elicits any number of hilarious answers. But for most people, being trapped in a lift is no laughing matter.

For anyone unfortunate enough to find themselves trapped between floors, help is on hand. Pressing the emergency button will likely put you through to Lemon Contact Centre, a leading BPO for the lift trade.

In the two decades since its humble beginnings in a converted garage, Lemon has carved a niche within the sector, supported thousands of lift maintenance calls, and learnt a thing or two about how to resolve an issue quickly and safely, but most importantly – how to put callers at ease in what is undoubtedly a stressful situation.

Jen Cummins, Chief Operating Officer at Lemon, explains: "colleagues are trained to navigate a conversation to get the information needed to assist the person on the end of the phone. and put a passenger in a stressful situation at ease."

"A big part of helping someone who is experiencing a tough time is being able to put yourselves into their shoes so you can help them. We place a huge emphasis on forging a human connection on the end of the phone or email. We don't use call scripts so that operatives can have an authentic dialogue with callers and build a rapport. Instead, colleagues are trained to navigate a conversation to get the information needed to assist the person on the end of the phone or email. It is an ongoing process for Lemon, we regularly review calls with operatives so they can continually develop their skills and we can deliver the best service.

Customer experience is all about how you shape a conversation. Tone of voice, active listening and the ability to engage with a caller on a human level are key to being able to give a satisfactory resolution, whether dealing with an entrapment, a maintenance issue or speaking to an engineer to dispatch and pass a job. People are at the heart of everything we do at Lemon, be it our staff, our clients or their customers – they all deserve the very zest!"

Jen believes a large part of Lemon's success is its focus on integrating itself into a client's business operations: "Lemon's operators are online 24 / 7 because we know how important it is to our clients that their customer calls are handled with the same level of care and high standard that they would provide themselves, whether it's midday on a Tuesday or Saturday at 3AM.

"We are an extension of our clients' business and work directly with their portals and CRM systems, making operations smoother, and support quicker. Our bespoke live dashboards can give our clients access to instant data on work volume so they can make up to date, data-led decisions. We hold ourselves to the highest standards, especially when it comes to data; we have received UKAS audited ISO 9001 and ISO 27001 certification to give everyone peace of mind that we treat their business and client data with the trust and integrity that it requires."

CONTACT »

Alexandra Routledge
Head of Client Engagement
Tel: **0800 612 7595**
Email: ***ARoutledge@no-sour-business.co.uk***

https://www.lemoncontactcentre.co.uk/

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EDITOR AT LARGE

It was a great pleasure to be invited to see DAC's new factory in Daventry - the first of what I hope will be many visits to friends of Lift Industry News!

The UK's leading manufacturer of lift control systems was started by Yan Phoenix and his wife Mandy in 2009 with a clear goal: to innovate and improve the lift manufacturing industry.

Since then they have supplied over 10,000 control panels to the UK industry. DAC product can be found in high profile government buildings, major high street retailers, local authorities, hospitals, hotels, schools and universities, nursing homes, museums, factories and blue-chip companies.

All the products are designed and developed in-house from their spotlessly clean and bright 18,000 square foot UK-based factory in the Midlands, using the latest technology and highly skilled product staff to stay at the forefront of lift technology.

The goal of innovation was visible everywhere. The machine that puts the chips into the boards was fascinating to watch – we learned that chips come on huge reels. And the machine that stores the chips in a climate friendly environment and delivers on demand was futuristic technology at its best!

We watched the PCB surface mount line in action and were so impressed by the dedication of each and every member of the team, working together seamlessly. We are used to seeing cars built by robots, the team at DAC were just as efficient and detailed!

We could have watched the digitally controlled storage system for hours as it delivered parts and returned stock to the system.

Quality, repeatability, reliability and efficiency are the watchwords at DAC and evident in every stage of their operation – including repurposing their LIFTEX stand as a marketing tool IN the factory.

Everybody we met was so friendly and obviously proud of the work they were doing, a real testament to the DAC philosophy of encouraging collaboration and fostering community.

There are lots of future plans at DAC – watch out for news in the July edition of Lift Industry News when we hope to bring you an insight into the new training room.

A huge thank you to Yan, Mandy, Andrea and the whole team at DAC for making us so welcome and taking the time to show us round, it was a real privilege to visit you.

KEEPING IT GREEN

The factory has low energy LED lighting and energy efficient heating, manufacturing is lead free and there is recycled solder fume extraction giving out pure air.

Designed to last so less landfill. DAC strive to design systems that are backward compatible to ensure they can support the life of a control system which is approximately 20 years.

LETTER FROM AMERICA

Economists define the extremes of market competitiveness as monopolistic and perfect competition.

Understanding the competitive nature of the lift industry in the USA

Economists define the extremes of market competitiveness as monopolistic and perfect competition.

We are all familiar with the term monopoly where one firm is the only supplier of a product.

Perfect competition exists in industries where there are many suppliers that manufacture or sell commodities such as chemicals or wheat.

The following table compares the most common characteristics of the two extremes of competitiveness:

	Monopolistic	Perfectly competitive
Sellers	One	Many
Buyers	Few	Many
Substitute Products	None	Many
Barriers to entry	Significant	None
Compete on	Product Features, Quality	Price
Profits	Very High	Almost None

In the real world, or at least in the free world, there are few if any examples of either a true monopoly or a perfectly competitive supplier. There is a wide range between the two extremes, and most competitors engage in what economists refer to as Imperfect Competition.

If a market is functioning in a manner that is close to being a monopoly, it is referred to as an **oligopoly**.

THE NEW INSTALLATION MARKET

The new installation lift industry in the USA is commonly described as an oligopoly.

In an oligopoly, a few firms dominate the market. These companies can be fiercely competitive, but they are highly profitable. This indicates that they have pricing power.

One way of determining where an industry is placed in the competitiveness range between monopolistic and perfectly competitive is the percent of the market share of the four largest competitors. In an oligopoly, the top four usually dominate seventy or more percent of the market.

In the USA, KONE, Otis, Schindler, and TK Elevator have a combined market share of over 70%.

THE SERVICE AND REPAIR MARKET

The service and repair market in the US is much more complex and competitive than the new installation market.

For the first few years after installation, the market for service on sophisticated lifts and escalators tends to behave like an oligopoly. Proprietary controls present a barrier to entry from competitors. There are very few sellers. Prices and profits are high.

As the age of a lift installation increases, the situation becomes more competitive. Over time, independent service providers and even multinational companies develop the ability to maintain proprietary control systems. The market share of the four largest competitors in the overall service market is less than 70%. Competitors tend to be local or regional firms that are very independent.

The combined market share of these independent service providers tends to remain constant over time. Well-run independents grow, gain market share, and then are often acquired by multinational lift companies.

MODERNIZATION

One of the barriers to entry in service is knowledge and experience. The barrier to entry in modernization is also knowledge and experience. However, the required levels of knowledge and experience are much greater for modernization than for service.

Poorly executed modernizations have caused many companies to exit this line of business.

As the supply of qualified modernization companies is limited, the prices and profit levels of modernization are higher than for maintenance.

HOW DIFFERENT IS THE COMPETITIVE ENVIRONMENT OF THE LIFT INDUSTRY IN THE US COMPARED TO THE UK AND THE REST OF THE WORLD?

I would like to hear your comments.

RORY SMITH

Rory Smith is Visiting Professor in Engineering/Lift Technology at the University of Northampton. He has over 53 years of lift industry experience during which he held positions in research and development, manufacturing, installation, service, modernization, and sales. His areas of special interest are Robotics, Machine Learning, Traffic Analysis, dispatching algorithms, and ride quality. Numerous patents have been awarded for his work.

ELEVATOR PITCH

Today we find ourselves staring up at the impressive Battersea Power Station, and the incredible Lift 109. A thrilling 109-metre ride up and a chance to take in the 360-degree views over London gives us enough time to chat with Ben Marmon, Founder and Director of RECLifts, providing the lift and escalator industry with hand-picked, tailormade recruitment solutions.

DOORS CLOSING, GOING UP...

TELL ME ABOUT RECLIFTS – WHAT DO YOU DO?

We are lift industry recruitment experts. We recruit lift engineers for traditional passenger lifts as well as stairlifts, platforms, escalators and automation.

We successfully recruit personnel in sales, management, projects and design, from junior to senior, nationwide. You could say the skillsets are varied, but the industry is very niche!

HOW DID YOU GET INTO YOUR ROLE?

I was in another similar role, still recruiting in the lift industry, and during COVID, with home-learning and looking after a baby, it just gave me the push I needed to go for it and set up on my own. I'm really proud of where we've got to in two and a half years, with really loyal clients and a lot of hard work. RECwork, The Recruitment Community, gave me the platform to set up and trade, and I've put my heart and soul into it – it's my baby and it's been a great journey so far, I love it.

WHAT SETS RECLIFTS APART FROM OTHER RECRUITMENT AGENCIES?

My USP is that I have many proven years of experience placing people in the lift industry. I'm not just a recruiter working at any high street agency. I am a specialist, and passionate about getting it the right the first time. You get me putting the right people in the right seats for the right reasons. We are fully invested in the process and finding alignment between candidate and client.

WHAT DO YOU ENJOY MOST ABOUT YOUR JOB?

I'll always enjoy the recruitment lifecycle. I love seeing things through, from bringing the business on, headhunting the right talent and then helping that person prepare for their interview.

It's important to spend time with them, helping them be the best they can be, so they are as prepared as possible.

Training my apprentice is also one of the best parts of my job – watching her learn and see how I do it and what I do, because it's not easy at times! There's a lot of juggling and learning how to look after candidates every step of the process so they don't stray and confuse themselves with multiple offers and interviews. We do well at keeping them close to REClifts and we can give them loads of options to keep the recruitment in-house.

WHAT ARE YOUR TOP PRIORITIES AT THE MOMENT?

Talent attraction! We spend a lot of time and resources attracting people and then working with them to make sure they have longevity in their careers, checking skills and references etc so we can guide them appropriately.

My second priority is candidate control – talent retention, building trust and rapport with candidates and helping them through each level of the recruitment process.

That's key, creating that connection with the candidate, building trust and relationships and then maintaining them.

WHAT'S YOUR BIGGEST SUCCESS TO DATE?

Being a preferred supplier for one of the 'Big Five' – it's been a major goal of mine, personally. We have placed tonnes of candidates across a range of skillsets nationwide with TK Elevators – all of whom are still there – it's about building and maintaining lasting connections. We regularly work with all the senior stakeholders in the business across the whole of the UK and Ireland.

WHAT DO YOU ENJOY DOING MOST, OUTSIDE OF WORK?

Spending time with my family! I work long hours during the week, but the weekend is for them. We love the simple things, being outside, going to the woods, you can't beat it. I'm getting married in May, so there's a lot of preparation for that, and I've developed a passion for weight training and being in the gym as well.

WHAT'S YOUR ALL-TIME FAVOURITE MOVIE?

The Pursuit of Happyness – it's such a lovely film, it really resonates with me.

FAVOURITE DESSERT.

Cheesecake. Any kind, but Oreo cheesecake is the best.

IF YOU COULD CHOOSE TO LIVE ANYWHERE IN THE WORLD, WHERE WOULD IT BE AND WHY?

Greece. I spent my childhood and teenage years travelling around the Greek Ionian islands, I've been to about 30 of them. Recently we went to Santorini where I was going to propose, but after a couple of cancellations, due to Covid, I ended up proposing in York, up the Shambles! Not long now until the Big Day – middle of May – very exciting times ahead!

IF I GAVE YOU A SIMPLE £5 NOTE RIGHT NOW, WHAT WOULD YOU DO WITH IT?

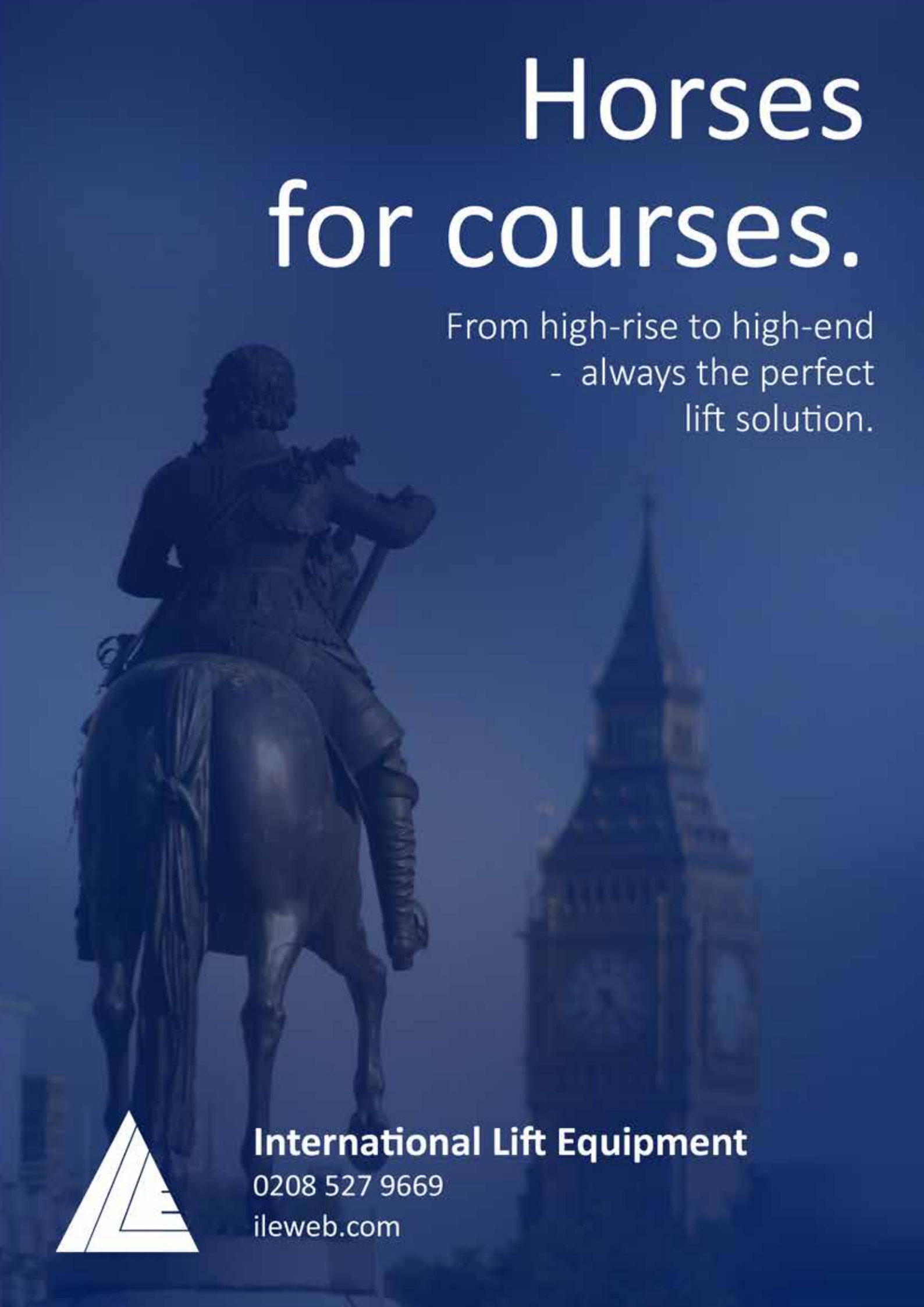
I'd give it to a charity close to my heart – Denise's Homeless Charity in Leicester. I've recently provided their team with uniforms so they're recognisable when out working with people experiencing homelessness, giving them food, sleeping bags and other vital things.

IF YOU HAD TO CHOOSE YOUR FAVOURITE LIFT, ANYWHERE IN THE WORLD, WHICH ONE WOULD IT BE?

It's got to be this one! Lift 109 – I've always wanted to go on it – it's like Charlie and the Chocolate Factory and the great glass elevator that comes out the top of the chimney! I brought the kids, it's the most fun lift, I loved it to bits.

It really is a brilliant lift, and those views across London are unmatched. Highly recommended, but now it's time to take the journey back down to ground level. Thanks to Ben for sharing a moment of his time with us.

http://www.reclifts.co.uk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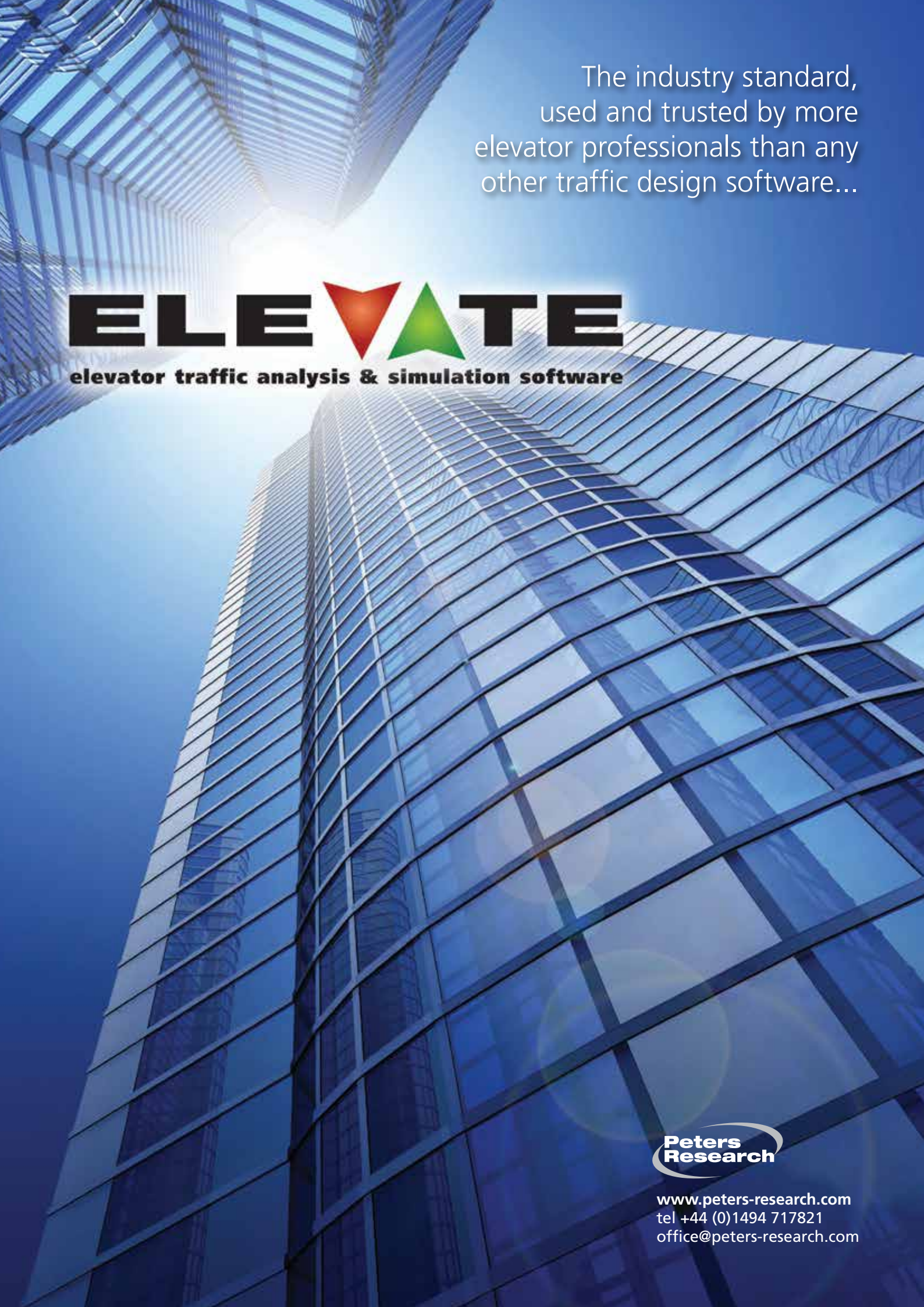
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LETTERS FROM THE PIT

John is Lift Industry News' very own agony uncle and is here to support you when your vertical transportation relationship is going through a bad patch.
WISH TO ASK JOHN A QUESTION »
www.liftindustrynews.com/dearjohn or scan the QR code.

JOHN BENTLEY

John is an established professional within the lift industry, with over 42 years of varied management and technical experience. Since 2015 he has been part owner of LECS (UK) Ltd employed as a Director and Project Engineer covering all aspects of building transportation design and maintenance

DEAR JOHN

I heard that if I press the lift buttons in a sequence, the lift will come faster. It is true? If so, what is the sequence?

JOHN SAYS

You are absolutely right mate. This is a closely kept secret in the lift industry, and you are probably the only person outside the industry reading this reply, hopefully I am not giving too much away by sharing this with you.

If you wish to travel in the up direction then press an up arrow on the landing and the lift will arrive, you can then enter it and press any floor you like to go up and the lift will take you there but only in the up direction. If you wish to travel down then press the down arrow on the landing, get in the lift on arrival and then press a call to go down. The little direction arrows ▲▼ light up on the landing indicator (and sometimes in the door jamb), this will assist you. If you press both landing buttons simultaneously (which is what some clever folk do), then the lift may arrive quicker but it's a 50/50 chance it's going in the direction you wish to travel in. Get in anyway and take a chance, it's what life's all about.

You can also try getting into a busy lift with an almost full car and then press all the car push floor buttons (this works well in hi-rise buildings). This will result in you exiting the lift much quicker than you thought and quite possibly at the very next floor. This sequence works particularly well in offices on Friday evening or Monday morning in Manchester, Newcastle and Glasgow.

If you're interested in a few more lift industry insider tricks, you could also try the following:

If a lift is descending at full speed onto its buffers, try to gauge the impact point and then jump up just a fraction before the lift car lands. Be careful not to jump too high or you may bump your head on the ceiling. Another great tip for ensuring the lift is always at your floor in your flat or apartment is to force the doors back really hard by hand or maybe jam a piece of wood in them until they fail to close automatically. That way you will find the lift car sat with its doors open on your floor every time you leave the building via the stairs.

If you have a goods lift at work, try leaving the landing gates open every time you use the lift. This helps the health of your colleagues by forcing them to run up the stairs every time they need to use the lift. It's a win/win situation and great for team morale. Try it. Thanks again for taking time away from YouTube to write in.

Note from the Editor: *The quote "ask a silly question, get a silly answer" is an old proverb, which means that if you ask a foolish or nonsensical question, you should not expect to receive a serious or meaningful answer. The origin of the quote is not clear, but it is often attributed to various sources, including children's books, comedians, and philosophers. One of the earliest known uses of this phrase was in a collection of English proverbs published in 1903, where it was listed as "Ask a silly question, and you will get a silly answer." Since then, the phrase has become a popular saying used to humorously respond to someone who asks a question that is either obvious or absurd.*

"I believe that the future of IoT and Smart Building will be a combination of our expertise utilising real-time, condition and predictive monitoring"

LIFT MONITORING SOLUTIONS FOR OVER 40 YEARS

Adrian Mace
TVC Technical Manager

Thames Valley Controls have been offering lift remote monitoring solutions for over 40 years. Adrian Mace, Technical Manager embarked on his journey of lift monitoring solutions with TVC in 1991.

I've witnessed the vast developments in lift monitoring over the decades, the requirements of building owners and building managers have significantly changed.

Over those years, the spectrum of products and requirements has grown drastically, and we've always ensured we offer a full range of best-in-class services to a wide range of customers. I've seen the evolution, from basic real time monitoring through to condition monitoring and on to predictive monitoring; data scientist experts are employed to collect, analyse and interpret data to help drive decision-making process for greater asset maintenance.

We work with over 130 organisations across the private and public sector, providing a comprehensive range of solutions to many London and national local authorities, housing associations, hospitals, universities, major transportation networks and key retail outlets across the country. We are currently working with major lift companies within the USA, providing opportunities to monitor thousands of lifts.

With varying needs and requirements, our monitoring solutions are flexible and versatile to accommodate the wide array of market sectors. Spanning those three levels of asset monitoring; real time, condition and predictive, we currently have over 10,000 units installed, and counting!

As with many systems these days, our CMS Anywhere System is cloud-based, but the uniqueness of our system is that it drives digital building performance through monitoring, authenticating data to remote visual inspections of equipment on site.

Here you can quickly and easily view all asset data as well as a live CCTV feed, and it also links directly to information screens at lifts' locations. Screens provide notifications and updates of lift and building service, planned outages for maintenance, as well as other building services, removing the need to mailshot each affected customer, prior to work. Lifts can also be turned on and off remotely using the same system, perfect for our customers in places such as unmanned railway stations. All this can be done using a single web-based system, from wherever you are.

I believe that the future of IoT and Smart Building will be a combination of our expertise utilising real-time, condition and predictive monitoring which will drastically change how building owners, building managers and engineers work offering proactivity, reducing asset failure rates, saving money on reducing our carbon footprint by reducing the necessity for site visits.

This system of next generation monitoring devices from TVC supports our customers' desire for a more sustainable approach, offering productivity enhancements, reducing site visits, and saving time and fuel. The system is helping to facilitate smart buildings, leading the way as a predictive solution – always learning and adapting to each customer's needs.

"We see this as the future monitoring of lifts – and not just lifts, this system can be used across a variety of assets for real time, condition and predictive monitoring, managed from any device, anywhere!"

To find out more about CMS Anywhere, or any of TVC's solutions, visit https://www.tvcl.co.uk or contact us for more information on 01352 793222.

CMS ANYWHERE

ethos Internet of Things

tvc A VANTAGE Company

THE LUTON DART

The Luton DART is an innovative passenger transit system, connecting Luton Airport Parkway station to London Luton Airport in under 4 minutes.

Construction on the Luton DART started in April 2018, and it was announced that the system would be a Cable Liner, manufactured by the Austrian transit manufacturer, Doppelmayr Cable Car (DCC), that also has a contract to operate the system for the first five years. The vehicles were built by the Austrian cabin manufacturer Carvatech.

Working on behalf of the UK's Department of Transport, LECS UK was appointed to the project to advise on stage 1 and stage 2 authorisation under the Cableways Installations Regulations. **Dave Cooper CEO of LECS UK said: "These are very complex systems so the primary focus is safety. The aim of the Cableways Installations Regulations is to govern the safe design and operation of cableway installations. The directive covers funicular railways, cliff lifts, cable cars, gondolas, chair lifts and drag lifts as well as subsystems and safety components. Any cableway built or modified after 1986 must comply."**

The DART (Direct Air-Rail Transit) is a cable-drawn, driverless railway running on a 1.4-mile (2.2km) line connecting Luton Airport Parkway station to the airport terminal in just over three minutes, 24 hours a day. The DART route includes a 350m (1,148 ft) long viaduct, a bridge over a dual carriageway and a new underground station at the airport. In total, the 2.2 km DART combines seven different types of structure and an autonomous light rail system. LECS were involved two separate authorisation stages. Firstly, the main contractor applies to the Authorisation body, which grants authorisation when it is satisfied the system will be safe, complies with essential requirements of the Directive and the competence of those involved. They also consider engineering and environmental factors. Secondly, the operator must apply to the Authorisation Body that grant authorisation when satisfied the system has been installed correctly and the system for monitoring safety is adequate.

There are two phases in relation to installations:

STAGE 1: Authorisation of work for construction or modification of an installation. The main contractor must apply to the Authorisation Body. Authorisation is granted once it has been established that the proposed system will be safe, taking into account the environmental and engineering factors at the site, compliance with the essential requirements of the Directive for the components and subsystems and the competence of those involved in the construction.

STAGE 2: Authorisation of putting into service a cableway installation. The operator/intended operator must apply to the Authorisation Body. This authorisation is granted once it has been demonstrated to the satisfaction of the Authorising Body that the installation has been undertaken correctly and that the system of monitoring the operating safety of the installation throughout its service life is adequate.

Only once both stages of authorisation have been completed the system can legally be put into service.

Starting at the purpose-built Luton Parkway station the Dart runs on a 350m long viaduct, before transitioning to a 72m long, 1,000t steel truss bridge with composite deck that runs over a live dual carriageway. The Dart then weaves its way past the airport's landing lights, through a 600m long cut and fill section before entering a 500m long concrete base trough section. It then heads underground into a 350m cut and cover tunnel, which dips beneath the airport's taxiway and into a new Central Terminal station, 20m beneath the airport's current drop-off area. This facilitates a 30-minute transfer from London St Pancras station to Luton Airport terminal.

The King was given a special trip on the DART during a visit in December with the line due to carry its first passengers in April 2023.

The DART also fits the airport's green agenda to shift passenger traffic from road to rail and reduce congestion around Luton.

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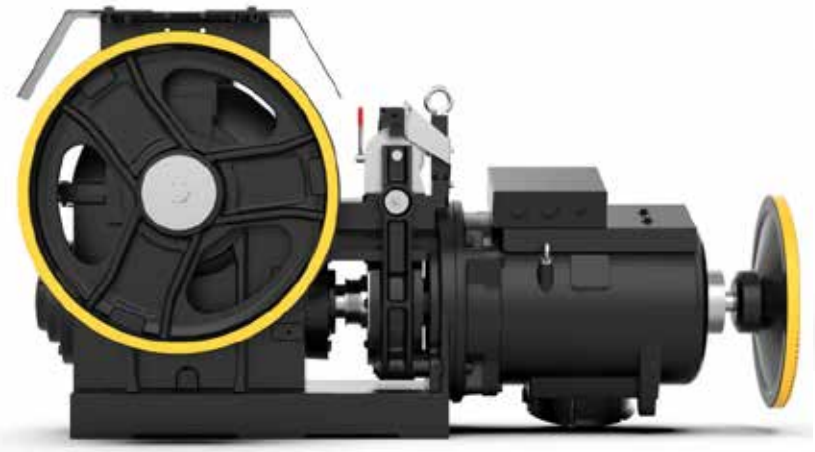

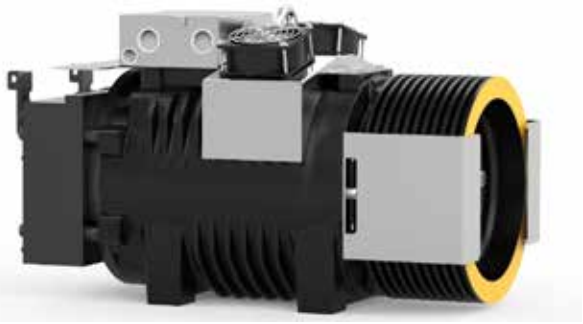

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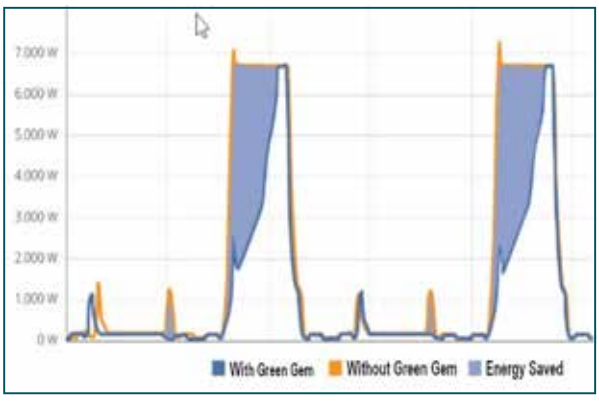

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