

# 3<sup>rd</sup> Symposium on Lift and Escalator Technologies

## Lift design for modern buildings: What is the market looking for?

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**Abstract.** This paper sets out to look at lift design from a building marketing perspective and to explore how BCO 2009 has changed the understanding of letting agents, tenants and designers as to what is expected from modern lift design. The publication of BCO 2009 has fundamentally changed the way lift performance is viewed by sales and marketing organisations. The introduction of terms such as Average Waiting Time and Time to Destination are far more tangible than Handing Capacity and Interval. In addition the recognition of higher density levels and the use of simulation moves lift design to a new level which feeds through to the marketing of buildings.

### BACKGROUND

Prior to the publication of BCO 2009 [1], CIBSE Guide D [2] was used as the key reference document for lift traffic analysis. The 15% handing capacity and 30 second interval were the benchmark criteria used to assess and design lift systems for the modern office buildings of their era. Along with the performance criteria the CIBSE Guide D of the day also provided advice related to population density levels for varying types of office accommodation. For prestigious offices a density of one person to 14m<sup>2</sup> was detailed, and became the commonly used figure by many consultants and designers in their calculations. Having calculated the total population it was acceptable to apply a discount for absence.

Whilst this approach provided the basis for lift design for a considerable period, changes were taking place in the way buildings were being used. Office buildings were increasingly seen by tenants and owners as an asset that had to 'earn its keep'. The method employed to do this was to simply pack in more people. The impact of this obviously has implications beyond the ability of the lifts to handle the extra population, but this was seen as a means of making the building 'sweat' and to get more from the existing building without having to buy or lease more space.

On the face of it this could be seen as a reasonable approach and has many attractions for tenants with an expanding business, or those trying to consolidate their activities into a reduced number of locations. The down side of this approach is that the original building facilities, especially the lifts, are not always able to cope with the additional pressure created by the increased population. The thing to note here is that while the lift systems may have been designed for a population density of 1:14m<sup>2</sup> the other services, toilets, air handling, electrical services, etc were based on a design of 1:10<sup>2</sup>, an anomaly that meant the lift service suffered more than the other building services when increase density levels were imposed.

The idea of increasing building population densities came at a time when the financial markets were buoyant and trading floors were the areas of high population density. Typically this was detailed at 1:7m<sup>2</sup> and trading floors could contain significant numbers of people, so much so that special lift provision was made in many modern buildings to separate the traders lift service from that of the main passenger lifts.

In 2009 a new edition of BCO was published. Section 7 deals with vertical transportation and recognition is given to the changing technology in lift control systems, principally destination

control (DC) as well as the fact that lift system design has moved beyond mathematical calculation to traffic simulation. With the popular uptake of DC systems has come a different means of measuring lift performance, average waiting times (AWT) and time to destination (TTD). From a lift design standpoint the same criteria can now be applied to both conventional and DC systems given simulation techniques provides these details as part of the traffic analysis results.

As well as performance criteria for the up peak BCO 2009 also gives recognition to lunch time traffic performance. This arguably puts more pressure on the lift system than the morning up peak. An average waiting time during the lunch period together with a template for two way and inter floor traffic provides a benchmark for acceptable lift performance.

The publication of BCO 2009 has caused a fundamental shift in the way lift performance is detailed and assessed. In terms of the key point of reference it has moved the emphasis away from handling capacity and interval to average waiting time and time to destination.

In addition to detailing lift performance criteria BCO 2009 also sets out to recognise that density levels have increased and provides guidance on population densities based on 1:12m<sup>2</sup>. Taking account of space utilisation at 80% of the net internal area (NIA) of the building an equivalent density of 1:10 is established. Although not specifically mentioned in Section 7 high density floors are generally recognised as having a density of 1:7m<sup>2</sup> or in some cases 1:6m<sup>2</sup>.

## **HOW BCO 2009 HAS CHANGED THE APPROACH TO DESIGNING AND LETTING BUILDINGS**

From the standpoint of building design and marketing this fundamental shift in lift performance measurement has meant that BCO 2009 is now the main point of reference for letting agents, tenants, developers and consultants. Average waiting times and time to destination are far more tangible to many than interval and handling capacity.

From the developer's perspective the key drivers to letting a building are the three L's; lobbies, loos and lifts. These are the areas which are fitted out as part of the base build shell and core works by the developer. They are the main landlord managed areas and the ones that receive the most attention in terms of design finishes. In many respects the main lobby is a statement of the building's grandeur and is representative of the occupants and who they are. Lifts are a key element in the building as a whole but absolutely essential in terms of being able to provide quick and reliable access to the tenant spaces. Not only is good service required but also the lift interior design is seen as an extension of the lobby finishes, carrying through the expression of the architects design.

For the developer and letting agents, the ability of the lifts to service the building provides a major selling point to potential tenants. It should be recognised that generally letting agents, and some developers, know very little about lifts. However they are acutely aware of what is written in BCO 2009 and it is this that drives one of the main selling points; the lifts are 'BCO 2009 compliant'. So, what does this really mean and is it what the market is looking for?

Developers and letting agents are very aware of the market requirement for higher density levels in both general office and what are now termed 'high density' floors as opposed to perhaps 'trading' floors. Indeed it is the letting and marketing agencies that drive the trend, selling the benefits of higher densities, harder working buildings and a more efficient and cost effective means of managing the business.

Office floors have almost by default moved towards a density of 1:8m<sup>2</sup>, with ‘high density’ floors at 1:7m<sup>2</sup> or even 1:6m<sup>2</sup>. From a lift design perspective this presents a dilemma. What performance criteria do you design to with a much higher level of building population? Clearly, if you base the design on BCO density levels then the building will be under lifted; design to a higher density level then you are not, strictly speaking, BCO compliant.

With the higher density levels now required the key appears to be to design to BCO performance criteria based on the higher levels of density being called for. This inevitably means that more lifts are required to service the building.

With letting agents telling the developers that greater density levels are being sought the developer has to assess the risks associated with either designing to BCO 2009, i.e. 1:12m<sup>2</sup> and 80% utilisation, or, look to a higher level of density, 1:8m<sup>2</sup> perhaps, and find more lifts are required, with the resultant impact of a larger core and perhaps less net lettable area.

Here technology can help to some degree. The move to destination systems provides the main advantage in managing the up peak performance. It is recognised that the ability of DC systems to service lunch time traffic is not as good as conventional systems, but given the 40 second AWT these systems can provide a service to meet the BCO criteria. From a letting and marketing perspective, DC systems are seen as the latest technology and provide a good selling point for the building, albeit it is not always the best solution.

Clearly any building is in competition with other developments and whilst location can be a key issue what the building has to offer as a whole is a major consideration. Important among those factors are lifts and lift performance. A well lifted building with a robust design based on high density levels provides potential tenants with the assurance that the lifts will provide a good service. It will also stand due diligence by the tenants’ consultants and can provide a high degree of future proofing, assuming that not all floors are populated at the higher density levels from day one.

With the more tangible language of lift performance provided by BCO 2009 and a trend to higher density levels letting agents and developers have some key components to add to the sales brochures.

## **HOW LIFT DESIGN INFLUENCES THE SALES APPROACH.**

Most buildings today have some degree of pre letting before building works start. Those developments that are speculative have to try and ensure that the design will attract tenants. The advantage of the speculative buildings is that lead times for tenant occupation are reduced. However, those looking for a ready made solution will have to live within the constraints of the original design and services. To this degree the speculative developer has to try to ensure that what he builds fits with the sectors of the market the development is intended to address, and provides a suitable level of robustness for the future.

The bespoke design allows the developer to tailor the building to a specific tenants needs and provide a building that fits with the requirements of their business. On the other side of the equation is the fact that the tenant may only be occupying part of the building and at some point may decide to move. This leaves the owner with a building that needs to be re-let some considerable time after it was built. To this end the building needs to provide suitable future proofing to allow for a change in use and to have the ability to be refitted for new tenants with their unique needs.

From a lift design perspective what are the elements of base build design that will at least go some way to providing the flexibility needed for the future? Firstly, the lift design has to have the ability

to be adapted to suit varying levels of tenant space take. This obviously means it needs to account for single or multi tenant occupancy both at the original design stage and in the future.

For tall buildings multiple transfer floor options between groups gives a high degree of flexibility. It allows a range of space to be made available, particularly to tenants who are seeking to have a group of lifts dedicated to their own business. This brings obvious compromises in terms of building NIA, location of low rise overrun and machine rooms and lift lobby space. It also means that each group should be capable of serving all floors at the density levels being designed for. While this may seem somewhat excessive, it does offer real flexibility and provides the letting and marketing agents with a key feature when seeking tenants.

Floors	Low	High
12		
11		
10		
9		
8		
7	Transfer	Transfer
6	Transfer	Transfer
5	Transfer	Transfer
4		
3		
2		
1		
0		

Multiple transfer floor options provides flexibility

Another way in which the building design can be enhanced is leaving ‘soft spots’ for the introduction of escalators at a later date, especially to serve the lower floors. Where these floors may be designed for a density of 1:8m<sup>2</sup> initially the introduction of escalators could allow a change to ‘high density’ levels. This has limitations and would only be considered for the first two floors perhaps, but it does provide the building with greater flexibility over its’ life. Escalators do take up space, but for developers and letting agents having the option is seen as a considerable advantage.

Most buildings today in the UK have concrete cores and in some instances of lower rise buildings, 15 to 20 floors, it is necessary to take the whole core to the top of the building for reasons of structural stability. This means the low rise lift shafts extend to the top of the building where the machine room is located. This is another means of providing flexibility within the building lift design whereby the lifts may stop at a predetermined floor but the guides are taken to the top of the shaft. This allows for the low rise lift service to be extended beyond its original level and can provide flexibility in the building going forward. There is a case in point where in one major office building in London this was undertaken and with the aid of destination control the building is now served by a 12 car group.

Floor	Low	High
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
0		

The low rise shaft extends to the top floor but the lifts can only serve to level 7

The ability of the building design to offer flexible solutions provides the letting and marketing agents with a key differentiating feature. This makes the building more attractive to potential tenants, not only at the time of leasing, but also in the future if the tenant requirements change and they seek to take more space in the same building.

These are examples of buildings where the initial design has been tailored to accommodate the specific requirements of the original tenant, however the ability to be adaptable in future has been recognised during the base build design. This approach provides the developer with office buildings that not only meet the requirements of tenants and potential purchasers but also provide a high degree of flexibility for the foreseeable future. From a commercial, marketing and letting standpoint this gives those buildings a significant advantage over the competition.

The market for letting buildings is highly competitive with prime office development space sought mostly by major corporations and businesses. To secure a major tenant is a significant achievement in the face of stiff competition. To provide the marketing and letting agents with the tools necessary to secure these key tenants, lifts play a major role. Many tenants come from buildings where they have experienced poor lift service with queuing, long waiting times and unreliability. In such circumstances one of the essential criteria of the new building is good lift service. So much so that in some instances service levels have to be maintained with N -1 lifts. This is clearly outside most design criteria but it does illustrate the importance of lift service to organisations that have demanding standards and want to ensure they have robust lift service. The idea that staff may wait for long periods does not fit with the needs of the business where 'time at the desk' is everything.

With a robust and flexible shell and core vertical transportation design the marketing and letting agents are provided with a key ingredient with which to differentiate the development and its importance cannot be emphasised enough. A badly designed lift system with insufficient lifts will never be right. Once the building is built it will always have a reputation for poor lift service and a huge investment is permanently undermined.

## **VERTICAL TRANSPORTATION; MEETING THE TENANT'S REQUIREMENTS**

As well as the lift systems providing a robust and flexible means of aiding the letting of the building there are other key elements of the lift system that the agents and potential tenants look for.

The need to demonstrate that the building is equipped with the latest technology is essential. This extends to the lifts as much as any other part of the building and while 'artificial intelligence' is no longer seen as a major feature, the most obvious technological change has been in the use of destination control systems. Although not new to the lift industry, they have almost become the default system for new buildings, bringing with them the ability to act as an 'up peak booster'. Notwithstanding the shortcomings of the systems in handling two way traffic, especially at lunch times, they are seen as the latest thing in technological terms.

This is a tribute to the marketing ability of the lift industry, who, in the main have been slow to recognise the importance of the system. Nevertheless they have recognised that the system is seen as 'state of the art' and peripheral parts, namely the user interfaces, can be provided with touch screens giving the ability to personalise the 'user experience'.

The ability to offer a personalised service is a major aspiration of companies, as well as letting and marketing agents. The use of landing touch screens and in car displays offers the opportunity to 'tailor' lift travel. The opportunity to display a company logo and business details on screens in the cars and at the lobby's call stations is seen as an extended means of advertising and selling the company message. Some of the recent requests I am aware of include:

- The requirement to group employees of one company in a lift and run a corporate video as the car travels to the floor.
- Have the ability to provide a bespoke 'greeting' message on the landing call station screen, 'Good morning Jack, have a nice day!'
- Run a company promotional video on the car screen for visitors to a particular floor.
- Advise your anticipated travel time while travelling in the lift.

Whilst some of these requests may appear excessive they do demonstrate what the marketing and letting agents are seeking as a means of differentiating one building from the next. These are part of the 'arrival and user experience' and are seen as the means of making you feel better about both the building and your interface to it.

'Green' is an important part of lift design and the need to comply with the BREEAM requirements as part of the design process is a 'must have'. Regenerative drives and power shut down when idle are becoming an increasing part of lift specifications. Although lift power consumption is a small part of the total building usage, percentage savings within the lift element are important and seen by agents and tenants as important.

As an extension of the green agenda, sustainability within the design and life of the lift are now becoming important parts of the approach taken by manufacturers. The need to demonstrate that the lifts form part of the overall strategic approach to building design is assuming ever increasing importance. This is a key factor looked for by letting and marketing agents and the ability to demonstrate that, not only are the lift materials sourced from sustainable materials, but also the ability to recycle equipment at the end of its life are taking on an ever increasing importance.

As with all buildings there is now great emphasis on security. In this the lifts have an important part to play. There is now a link between major lift suppliers and security companies as part of an effort to provide a 'total' lift/security solution. The move is part of the growing need to reassure people

they are safe, not only at work, but also in their own properties. In the workplace the ability to demonstrate that security is high on the employers' agenda is a significant driver and there is great emphasis on security systems.

Card readers are now the main means of access to most buildings. Their use on the call station of destination systems is an option widely available. This not only provides a means of ensuring the building user only has access to their designated floors, but also provides a level of assurance to other tenants that their own floors are more secure; albeit the main point of security to the tenant demise is generally at the tenants lift lobby where further card readers are deployed. This type of facility is also seen as 'state of the art' and requires a high level of interface between the lift and security systems. This can be challenging but it is seen as technologically advanced and adds to the feeling that tenants are secure; a key selling point.

Increasingly the ability to interface to a smart phone or a tablet is seen as both essential and modern. Lift systems are now being designed with facilities that will allow remote calling of a lift. This is in its infancy but will increasingly become a standard feature. While this may sound a good idea to the marketing agent in reality there are many variables to cater for, your location relative to the lift, your walking speed, distractions and interruptions on your way to the lift lobby. I'm sure there are many others and this will perhaps fall into the category of 'it sounded a good idea at the time'.

However, there are other areas where information to a smart phone or tablet could provide useful information to designated users, such as facilities managers, lift companies and monitoring consultants. Details of lift service levels, breakdowns and performance data could be sent to hand held devices and provide a means of identifying problems at an early stage. Currently this type of information is used in remote monitoring, generally by the lift company, but its wider availability to designated users can only be a matter of time. When it does arrive it will be another useful selling aid to the agents.

The linking of the lift system to turnstiles is something that has been seen as 'state of the art' by agents. However building users, consultants and the industry are beginning to move away from the idea, especially where longer walking distances are involved. Better to have the turnstile provide the 'right of passage' and the passenger register their destination call at or near the lift lobby. The only possible exception is where the turnstiles are directly in front of the lift lobby as walking distances are short

As with all office buildings each is unique in some way and the needs and requirements of tenants and building users are different in each case. However the ability for lifts and lift systems to be able to be adapted to suit the needs of particular tenants is fundamental to the marketing and letting of the building. The tenant is 'King' and whatever needs to be done to satisfy his requirements, either totally or in part, is an essential part of the selling strategy.

## **A LIFT RATING FOR BUILDINGS?**

One of the items that has become something of an industry talking point is a rating system for lift service in buildings. Currently CIBSE Guide D [3] details a star rating system which on the face of it sound reasonable. The idea that criteria can be established to provide a system of star rating does have logic and would allow an instant assessment of a buildings lifting capability.

There are however some significant drawbacks to the star rating approach. In the first instance who establishes the rating? Is it the lift supplier, the consultant, the building owner or some other body? Whoever it may be there are always going to be grey areas and borderline cases. We are all too

aware that traffic figures can be 'adjusted' through changes to the inputs and this could lead to unrealistic performance criteria being used just to achieve the right level of star rating.

It would be natural for the developer or owner to want the highest star rating for their latest building and this would undoubtedly be a very useful piece of marketing information to tempt potential tenants. The difficulty here is that the rating system sets too rigid a line with no flexibility within the measurement criteria. Is it realistic to classify a system with 20 seconds AWT as 5 star while a system with 21 seconds AWT is 4 stars? The fact that the star rating system does not align with the current BCO criteria is recognised by consultants and those close to the industry but given the BCO document is the main point of reference for developers and agents the differences are not highlighted.

Whilst CIBSE Guide D states the star rating criteria only applies to new modern office buildings it would not be unreasonable for owners to seek to apply it to existing and modernised buildings, especially if they thought it would give them an edge in the market. We know that many, until the early/mid 2000's buildings, were still being designed on criteria of 30 second interval with a 12.5 % to 15% handling capacity and a density of 1:14m<sup>2</sup> with absenteeism. Even allowing for the use of destination control the lifts in these buildings will never meet the current BCO performance criteria let alone that of a building with a density of 1:8m<sup>2</sup>. So where would that leave those buildings in the eyes of the marketing and letting agents? I would suggest there would be a lot of very disgruntled owners and tenants who 'always knew the lifts were no good!'

The star rating system may seem like a good idea but in reality it cannot be used as an effective means of ranking lift performance. From the standpoint of the 'market' it would be used as a black and white measure and lead to owners, agents and tenants arguing over service charges and rents base on the star rating of the lifts.

In terms of what the market is looking for, 'BCO Complaint' is the key phrase. Whether that is based on a density of 1:10m<sup>2</sup> or 1:8m<sup>2</sup>, as long as the densities used are understood by all concerned there is little risk of misunderstanding or ambiguity.

## **CONCLUSIONS**

BCO 2009 has fundamentally changed the way lift performance is calculated and measured. It has recognised the use of simulation as a tool in the designing of lift systems and provides an easier means of assessing performance through the change in measurement criteria. It has also become the key point of reference for developers, consultants and letting agents.

Higher density levels and future flexibility are driving the need to provide robust designs that can be adapted to prolong the life of buildings and offer real long term investments for developers. Many of today's building do have the ability to adapt; something not always shared by their counterparts of the 1960's, 70's and 80's.

In today's competitive market place the development and letting of buildings is a complex process and like any product it has to meet the needs of the market. The expectations of the end user, the ability to deliver and flexibility for future adaptation are major parts of today's market requirements. New developments represent huge investments and getting things wrong at the design stage will leave a lasting legacy that will be stamped large on the building. Once a building gets a reputation for poor lift service it is almost impossible to erase, especially if the building is under lifted as opposed to having lift systems that are poorly adjusted or set up.

The market place is driven by letting and marketing agents who have little understanding of lifts but they know only too well that 'BCO Compliant' sells the message that the building is well served. The knowledge that the vertical transportation is designed as an integral part of a flexible approach provides both developers and the agents with an edge in the market place and provides tenants with the comfort that the building could cater for their future needs. It will stand the test of due diligence and deliver tenant satisfaction. This combined with the latest technical innovation, state of the art systems and equipment is a key criteria in selling to sophisticated tenants and demanding businesses.

The arrival and user 'experience' are all part of both the selling process and the ability to tailor interfaces, graphics and visitor management to the corporate image. A personalised journey in a 'safe' environment helps to send the message that the building reflects what the business is and 'who we are' and provides a place where employees are happy to work. These are seen as essential parts of providing an environment where people can focus on work and not be distracted by poor lift performance with long waiting times and the inability of systems to adapt to the changing world.

The question remains as to exactly what the true density levels in modern buildings really are but there is no ignoring the fact that buildings are having to work harder and 'earn their keep'.

The changing dynamic in terms of technology means that the ability of modern buildings to adapt is essential. This provides long term confidence to the developers and owners and makes the huge investment sustainable. The only real question is:

Has the tester set everything up correctly?

## **REFERENCES**

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