Case Study:
Vertical transportation of passengers

THAMESLINK PROGRAMME
LEARNING LEGACY

London Bridge Station Redevelopment

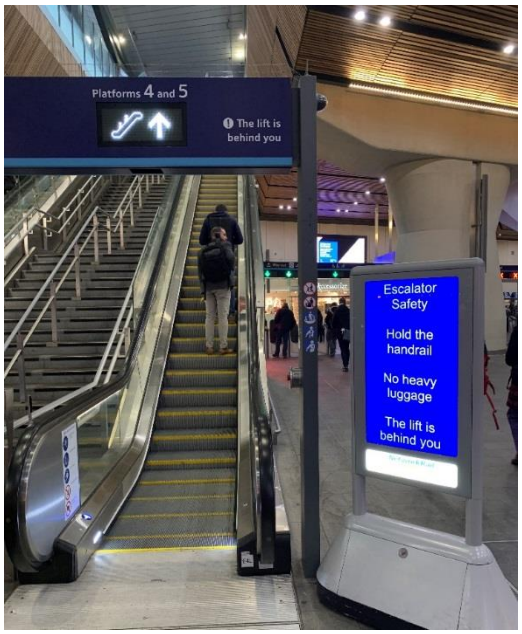
Recommendations for future projects planning vertical transportation of passengers using lifts and escalators

Station lifts, and escalators may appear to run effortlessly but it takes a huge amount of work to design and install them, get them running and keep them running. These unsung pieces of machinery are essential to keep passengers moving day in, day out.

With such an increase in forecasted passenger capacity and accessibility required at London Bridge, the lifts and escalators were one of the most critical elements of the new station from the start. In the modern station's design, they are now an integral part of the concourse and platforms that has enabled a better balance of passenger flow, increased accessibility and reduced overcrowding while helping to guide passengers to where they need to go quickly, safely and in comfort.

The vertical circulation of people

The new station has a clear, level separation between the pedestrian areas and the train platforms and a spacious new passageway connects it to the underground station. The old station was effectively split in two with ground-level platforms in very separate areas with just one lift and four escalators shared by staff and passengers alike. The new layout takes people between the lower-level underground station and the upper-level train platforms in a far more logical and cohesive way than before with all platforms accessible from one place.



Platforms 10 to 15 at the upper concourse are still accessible from the street level Shard entrance as well with new lifts and escalators to go down a level if required. Platforms 1 to 9 can only be accessed via the lifts and escalators by fare-paying passengers once they have passed through the gate line.

Although not every platform has its own dedicated lift, all platforms are accessible for mobility impaired passengers. During the design a decision had to be taken as to how many lifts could be accommodated within the platform and concourse areas without sacrificing valuable space. A careful balance/trade-off had to be found between passenger flow, station access, station maintenance, platform waiting space and concourse space. Obviously, there's also the additional lifecycle cost associated with each additional lift or escalator.

There were also other considerations for the specification, design and location of the lifts. These included the optimal loading weights and heights to ensure maintenance staff and equipment could also use the lifts and that during construction, the lifts would be a critical method for operatives and materials to get around the worksite while other routes were under construction.

Maintenance and reliability risks

The project team insisted on two to four weeks of intensive load-testing and fault-free running of the lifts prior to their handover. This would ensure that there were fewer failures when real-world usage began. Typically, the tolerances and adjustment of cables for new lifts can take a while to settle so plenty of load-testing should have avoided any nasty surprises.

With 27 escalators and 12 lifts to keep operational during station opening hours, the maintenance regime is intense. The machines take a huge strain almost continuously once the station is open and so they require a lot

of care. It is extremely important to run escalators in alternate directions day to day to reduce repetitive wear, failures and extend the operating life. To help run escalators in both directions, 'tick and cross' variable LED signs were installed to show passengers which direction escalators were working in or if any were closed.

Unfortunately, the reliability of the lifts and escalators once the station had opened was lower than expected. It was realised that the maintenance regime was probably not frequent enough overall. To solve this, an improved service level was agreed and implemented which resulted in a significant improvement. Before allowing for any unplanned failures, the regular, planned maintenance of the lifts and escalators came in at almost £400,000 per year so it was important to finetune the service level.

Key success factors

1. Product quality and design specification

The specified quality of materials used in the lift design was another important consideration. The lifts needed to be vandal-proof, extremely strong and hard-wearing but not to the detriment of load capacity and extra wear on the mechanisms. For example, a granite floor might be extremely hard wearing and long-lasting but might also reduce the load-weight / passenger capacity while increasing wear on the machinery. Again, a careful balance of all the factors was needed.

2. Safety upgrade

Following a safety incident involving a stopped escalator at Reading station which was not locked-off, the failsafe mechanism on the London Bridge escalators was re-designed and improved by the supplier. Applying the lessons learnt from that incident meant that any escalators that had already been installed had to be retro-fitted with the upgraded parts and staff had to be trained to deploy the locking mechanism to prevent potential slip. As a result, the procedure changed to reflect that only a competent escalator engineer must put in writing that the escalator is mechanically locked and electrically isolated before it can be used as a fixed staircase.

3. Power supplies guarantee station performance

The escalators in the station were connected to the backup power supply. Therefore, if one of the two 20kV power supplies fails, the other can take over and the lifts and escalators will continue to operate. If both 20kV supplies go down, a backup 11kV supply kicks in to ensure that at least three of the four escalators can continue to run. This prevents severe performance issues as full trains continue to pull in to the platforms.

4. Wayfinding, manifestation and announcements

After the station had opened, some changes were made to the graphics on the clear glass lift shafts to make them easier to find for passengers. Before this, the glass design had led to some confusion as to which lift went to which platform. It also improved the appearance of the lifts which were previously showing every speck of unreachable dirt to passers-by.

Lifts were also retrospectively renamed to align with the platform numbers to help passengers navigate the station easily. Also, the announcements inside the lifts were adapted so that they announced which platform numbers they were serving. In the same way, the dual escalators per platform were renamed to include 'London end' and 'Country end' designations for easier operation and maintenance call-outs.

Summary / Key recommendations

- Allow at least two to four weeks of full load testing and fault-free running for all lifts and escalators prior to opening them for operational use.
- Machines should be operated in both directions to gain the correct design life.
- Ensure escalators are fitted with the correct fail-safe brakes at the factory.
- Design lifts to accommodate station maintenance equipment as well as passengers.
- Specify very strong but light-weight materials for longevity but without sacrificing operational wear.
- Where possible, if space, passenger flow and other considerations permit, have more than one lift available for a platform.
- The design of the station should include alternative (emergency) egress off the platform, this could be a ramp or access equipment through exits/back of house which could be managed by the station to prevent the mobility impaired being passed onto the next station that has lifts.

Author

Case Study produced with Martin Elliot, Network Rail Route Asset Manager, February 2019.

Further information

For more information on this Learning Legacy case study please email **contact@thameslinkprogramme.co.uk**