

Date: 30 June 2016

Item: Improving Escalator Safety

This paper will be considered in public

1 Summary

- 1.1 Accidents at the Platform Train Interface, on escalators and stairs account for 80 per cent of accidents on the London Underground (LU) network. The most serious injuries also occur in these areas. Approximately 40 per cent of customer accidents on the Underground occur on escalators.
- 1.2 This paper sets out the background to the LU Escalator Passenger Safety Strategy, the results of a trial of twelve escalator safety improvements and next steps.

2 Recommendation

- 2.1 **The Panel is asked to note the result of the trial and the next steps.**

3 Background

- 3.1 As noted above, a significant proportion of all customer accidents on the Underground network occur on escalators. The vast majority of customer accidents are not associated with operational or asset failure of the escalator, but with customer behaviour.
- 3.2 The LU Escalator Passenger Safety Strategy (EPSS) was created in order to develop and assess, under trial, a collection of initiatives intended to encourage safer customer behaviour whilst travelling on escalators. The trialed initiatives were a mixture of industry standard additions and new innovations.
- 3.3 The EPSS identified four key areas where there was a need to inform customers, either directly or subliminally, of safe ways to travel on escalators. These four key messages were:
 - (a) Hold the handrail;
 - (b) Walk / stand safely;
 - (c) Be aware of the step / landing interface; and
 - (d) Where possible, use lifts when mobility impaired.
- 3.4 From a wide array of initiatives, twelve initiatives were identified as being most likely to influence customer behaviour and improve customer safety. Some of these interventions are new approaches, whilst others are industry standards. The twelve initiatives were:

- (a) Passenger Positional Guides: Bi-directional footprints intended to guide passengers in their safe foot positioning whilst riding on escalators;
- (b) Step Edge Painting: Industry standard painting of step edges to highlight safe area to stand upon;
- (c) Step Riser Messaging: Safety messages stencilled on the black step risers;
- (d) Red Lexan Combs: Red escalator combs manufactured from Lexan polycarbonate, highlighting the interface between the moving step band and the static landing;
- (e) Under Step Lighting: White light shining up through the gaps between steps at the top and bottom landing to highlight changing geometry of the step in the transition between the landing and the incline and nearing the end of the moving stepway;
- (f) Top Comb lighting: Lighting element installed in the balustrade at foot level directly over the comb to highlight transition from landing to step band to stationary landing;
- (g) LCD Screens in Pattresses “e-Toblerone”: High definition bi-directional screens displaying safety messages mounted inside Pattresses on the balustrade between escalators;
- (h) Embedded Handrail signage: Safety messages permanently embedded in the surface of the handrail;
- (i) Virtual Assistant Projector “Hologram”: Mobile “Virtual Assistant” silhouette projector unit to impart safety messages installed near escalators;
- (j) Directional Speakers / PA messaging: Directional speakers at top and bottom of escalator, giving position specific messages;
- (k) Escalator Floor Vinyls: Temporary floor signage to encourage people to take caution when using an escalator and hold the handrail; and
- (l) Lift Floor Vinyls: Temporary floor signage to enhance awareness of station lift locations and encourage customers to use the lift instead of an escalator if mobility impaired.

3.5 The initiatives were trialled for four-six months on a number of locations (primarily at locations where there were high numbers of escalator accidents).

4 Criteria for success

4.1 The criteria for judging an initiative successful was deemed to be a reduction of 10 per cent of escalator related accidents. Due to the small scale of the trials and the resultant low level of statistical data available, it was considered that success could not be solely inferred from review of reported accidents on escalators.

4.2 To compensate for this, three other success criteria were used:

- (a) an increase in safe behaviours, or decrease in unsafe behaviours;

- (b) a survey of staff on stations where initiatives are installed to gain a further perspective on effectiveness; and
- (c) a technical review to measure the practicality of each initiative.

5 Results

5.1 The results of the trial and details about the successful initiatives are set out below.

5.2 The successful initiatives were:

- (a) Passenger Positional Guides (blue footprints) – accidents reduced by 27 per cent, customer behaviours changed (in desired way) by 21 per cent;
- (b) Step riser messages – customer behaviours changed (in desired way) by 13 per cent;
- (c) Red lexan combs – accidents reduced by 36 per cent, customer behaviours changed (in desired way) by 15.9 per cent;
- (d) E-toblerones – customer behaviours changed (in desired way) by 11 per cent;
- (e) Messages embedded in handrails – accidents reduced by 24 per cent, customer behaviours changed (in desired way) by 17.4 per cent;
- (f) Hologram message – accidents reduced by 13 per cent, customer behaviours changed (in desired way) by 19.9 per cent; and
- (g) Lift floor vinyls proved semi-effective. The lift floor vinyls trialled at Waterloo (from Wide Aisle Gate to lift) proved more effective.

5.3 Further detail is set out in the table below:

Initiative	Statistical Analysis (Accident reduction >10% ²)	Final Customer Behaviour (>10% ²)	Staff Survey	Technical Review	Overall Effective Decision
PPG (Blue Footprints)	27%	21%	Neutral	Pass	Yes
Step Edge Painting	-29%	2%	Negative	Fail	No
Step Riser Messaging	-20%	13%	Positive	Pass	Yes
Red Lexan Combs	36%	15.90%	Positive	Pass	Yes
Under Step Lighting	0%	0.08%	Negative	Pass	No
Top Comb Lighting	0%	2.10%	Negative	Pass	No
e-Toblerones	-21%	11.20%	Positive	Pass	Yes
Embedded Handrail Signs	23.80%	17.40%	Positive	Pass	Yes
Hologram	13.10%	19.90%	Positive	Pass	Yes
Speakers / PA	Nil	Nil	Nil	Fail	No
Escalator Floor Vinyls	-9%	7.60%	Negative	Pass	No
Lift Floor Vinyls Vinyls	22%	1.10%	Positive	Pass	Yes

5.4 Images of the safety features used are attached as Appendix 1.

6 Sharing lessons learnt

- 6.1 Improving escalator safety was an area of focus for the Office of Rail and Road (ORR) in recent years. LU's plans on improving customer safety on escalators have been shared regularly with the ORR over the past year. Following completion of the trial in April 2016, the results were shared with the ORR. The ORR has in turn shared LU's approach and trial with other railway operators.
- 6.2 One of the measures used by the ORR is a safety maturity model (Railway Management Maturity Model). This model scores safety maturity on a scale from 1 (ad hoc) to 5 (excellence).
- 6.3 The ORR's feedback on the Escalator Passenger Safety Strategy in April 2016 included the following scores (all out of a scale of 1-5). All criteria were scored specifically related to the approach taken by LU to customer escalator safety.

Leadership	4
Governance	4
Written Safety Management System	4
Worker involvement and internal cooperation	4
Organisational culture	3
Proactive monitoring arrangements	3

- 6.4 On the maturity of LU's governance for customer safety, in particular escalator safety, the ORR noted: "the governance structure has become embedded with independent challenge being provided by directors at two levels in the management system. This moves the 2015-16 score up to a 4 and work has already started to bench mark best practice in managing escalator safety (rather than governance) with other railway organisations, which when developed further should result in a move to a 5 as it should also result in reviewing/ challenging the governance structure."
- 6.5 The team involved in the trial have shared the lessons learned from the LU trials with railway colleagues, including within TfL, with metros in Paris and Stockholm, other UK Train Operating Companies and with Network Rail.

7 Next steps

- 7.1 The next step in this project is the roll out of the effective initiatives at appropriate locations across LU. Site meetings are being held at the 15 escalator machines which have the most accidents in LU. These are at 10 different stations. Site specific approaches are being taken as the risk factors differ at different locations, e.g. the factors at King's Cross St Pancras station (e.g. customers with luggage) are different to those at St John's Wood station. Local staff are working with the

relevant engineers, station planning teams and Health, Safety & Environment Managers to identify the appropriate solutions for each location.

List of appendices to this report:

Appendix 1: Examples of escalator safety initiatives

List of background papers:

None

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Examples of escalator safety initiatives trialled



Passenger Positional Guides



Step Edge Painting



Lift floor vinyls



E-Toblerones



Message embedded in handrail



Hologram



Red lexan combs