Case Study:
Metalwork and Cladding
London Bridge Station Redevelopment

*Lessons learned from the installation of plantroom acoustic walls, ventilation silencers, aerofoil plant screens, weather and architectural louvres.*

Emtec provided louvres and noise control equipment on the London Bridge project that would allow assets to ‘breathe’ efficiently whilst ensuring plant noise is controlled to specified levels.

**Key challenges**

1. The heritage façade louvres had to be designed to accommodate the existing Victorian brick arches. Every arch was different.

2. The ‘eyebrow’ shape service spine louvres (plant bridge deck above main concourse) were to be installed prior to peripheral interfacing trades. The complex shape therefore had to be in exactly the right place in order for the louvre opening to be formed around the louvres.

3. Track 9 louvres and acoustic panels had to be installed during the course of just three line possessions, ensuring temporary state installation.

4. Provision of experienced supervisors throughout the project.

5. Conveying ideas to designers and architects.

6. Short term planning to deal with changes to programme sequencing.

7. Getting paid.

**Project approach**

1. The use of ‘Point Cloud’ survey data meant each arch was individually modelled and a bespoke laser-profile perimeter trim was manufactured to follow the form of the arch.

2. The use of Point Cloud survey data meant the periphery of the louvre could be set out to 3D coordinates and referenced to the common project origin.

3. Emtec could then develop completely new louvre mullion capable of 6m spans and rapid adjustment in X, Y and Z directions.

4. Operatives were directly employed rather than sub-contract labour.

5. Large mock-ups were constructed at the factory for inspection by architects, designers and Network Rail. Using point cloud data, a timber structure was water-jet cut to accurately represent to within +/- 1mm a segment of SU-48 brick arch, with a section of the proposed louvre then set into the arch complete with the proposed perimeter detail.

6. There were weekly progress meetings and provision of pro-active package managers by Costain.

7. An honest and open relationship was maintained with project surveyors, with regular meetings.
Outcomes

1. Bermondsey and Tooley Street arched louvre peripheries accurately follow the line of each arch with no need to remake any items (other than those that were damaged or rejected because of sub-standard anodising finish).

2. The plant bridge deck louvres were installed prior to the three interfacing trades (BCL, Prater and Lakesmere) to a degree of accuracy that meant their off-site manufactured panels fitted without the need to move or adjust the louvres.

3. The new louvre mullion allowed rapid adjustment and therefore installation. The mullion was capable of spanning the full 6m height of the louvres, eliminating the need for a stack joint and ensuring that the system was left in a structurally adequate state in between the possessions. The track 9 louvres were completed within the allowable possessions without the need to revisit the trackside face of the louvres.

4. Reduction in staff churn and gradual improvements in safety and quality throughout the 3½ year lifecycle of the project through lessons learnt and retention of knowledge within the business.

5. Off-site inspections of large scale mock-ups meant all stakeholders expectations were managed by agreeing details and benchmarking the desired quality. The Bermondsey Street louvres were all handed over with no comments relating to discrepancies between design intent drawings and the as-built structure.

Images of the Bermondsey Street arch louvre mock-up

A Bermondsey Street arched Louvre
6. A genuinely collaborative approach meant zero adversarial situations throughout the whole project, with a feeling amongst our project management staff that our package managers and Network Rail were working as hard as we were to make things happen so we could progress our works.

7. Early Warning Notices were carefully tracked, all variations were assessed and negotiated in a timely manner and applications for payment were discussed prior to submittal. The predicted final account value was updated and discussed on monthly basis. The result meant every application for payment was paid on time and the agreed final account value was within 1% of the predicted final account value.

Recommendations for future projects

a) Earlier appointment
   Earlier appointment would have enabled Emtec to have greater input into the design of our Stage 2 interfaces. In particular minor modifications to primary steelwork could have been incorporated, such as the inclusion of welded tabs and flags for the connection of our secondary steelwork. This happened for the Stage 3 works and it enabled the design to be simplified, safer to install and easier to inspect.

b) Greater use of off-site manufacture
   Emtec have a large factory capable of fabricating large modules in a controlled environment. Earlier appointment would have enabled them to manufacture the Service Spine aerofoil fins in modules for installation using a crane. As it happened, the time between their appointment and installation of the fins meant the cranes had been struck and the fins had to be installed in kit form, taking considerably longer, risk of damage during material movements and with operatives working at height for longer periods.

c) Logistical problems with delivering to an operational station towards the end of the project meant some materials were lost and a lot of unexpected time and resource required to locate items and move materials through the site, particularly when delivering goods via Manor Farm. Perhaps the development of a web based contractor consignment system would mean contractors could print labels with barcodes or unique numbers and fix to their goods to enable Costain’s logistics team to track the delivery and ensure it goes to the correct point on site.

d) Emtec suffered many delays trying to locate their access equipment. An alloy tower or MEWP would be left in place at the end of a day shift and not be there in the morning as it had been moved by another trade working on a night shift. Emtec also lost a number of MEWP control boxes, again going missing over night. The site protocols / standards need to balance the need for a night shift to be able to move a MEWP or a tower for safety reasons with preventing unauthorised borrowing of access equipment.

e) Requirement for non-working supervision for all activities
   As Emtec’s schedule of works reduced to a small number of two-man tasks, requiring simple hand tools and no access equipment, the standards needed to be reviewed to permit working supervision i.e. a two-man team comprising a working grey hat and working blue hat. This would remove the need for a redundant operative to stand and watch simple tasks taking place (eg. swapping over a door handle or section of skirting etc.).

f) Better coordination with MEP. Throughout the lifecycle of the project access to information regarding Emtec’s interfaces with MEP was limited. Better coordination at an earlier stage would have helped them to create designs that considered known MEP interfaces and help in the sequencing of events to inform the overall programme.

N.B. Emtec’s early involvement in the Stage 3 design meant moving the acoustic wall from directly behind the louvres to approximately 1 metre into the plantroom. This allowed easy access to the rear of the louvres via a ground floor and mezzanine service corridor, for close inspection and maintenance of the trackside louvres. It also took the coordination of the MEP duct connection openings in the acoustic panels off the programme critical path, as the design allowed the openings to be formed much later in the programme ensuring they were all formed to the correct size and in the right location first time – a real success story.
g) Standard doors
   A number of louvre doors on Tooley Street were one off designs, with late changes to the security 
   ratings etc. Adopting standard design would eliminate the need to create new products for each door, 
   reduce lead times and reduce DOWLs post installation.

h) Better contractor to contractor handovers
   Better managed contractor to contractor handovers would reduce the events where we need to return 
   to an area to complete works. This is an improvement for all parties to consider.

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Further information
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