

# LIGHTING JOURNAL

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June 2021

## LEGAL HIGHS

The challenges of lighting a law firm's high-rise London offices

## YORKSHIRE MORE

How a tuneable circadian lighting system has transformed Leeds City Station

## UNLOCKING THE CITY

Turning the 'Ki.' on Bradford's smart city experiment

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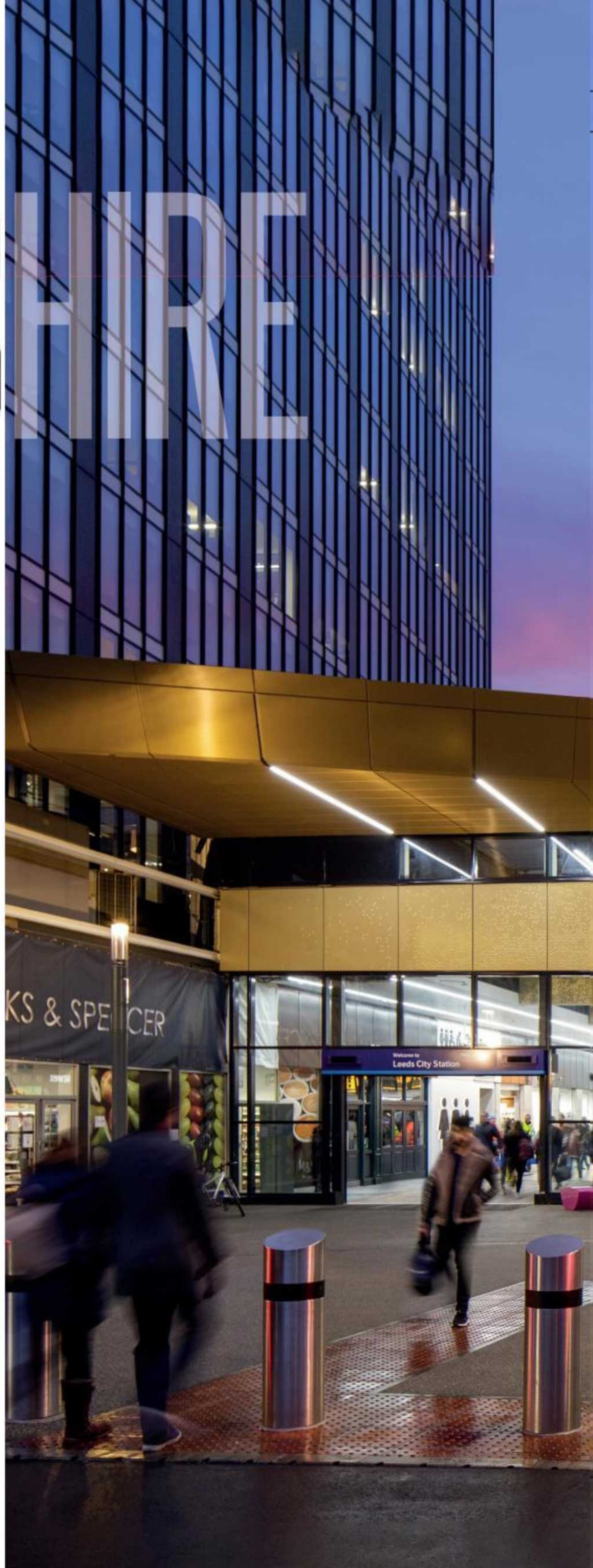
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# YORKSHIRE MORE

*From being a tired and somewhat dated space, Leeds City Station has been transformed through the installation of a new tuneable circadian lighting system, believed to be the first of its kind for a major transportation space*

*By Mike Kimmitt*





## Transport hub lighting

Leeds City Station is the UK's third busiest train station, outside of London, with some 30 million passengers a year passing through it, or at least it was until the pandemic. Hopefully, as our economy reopens, those numbers will begin to return; indeed, already the latest data is showing around 181,000 people are now travelling through the station on a weekly basis, which is great news.

Irrespective of whether passengers have been travelling throughout the pandemic or are only now coming back on to the railways, anyone passing through Leeds City Station will, I hope, now be in for a very pleasant surprise.

That is because in early 2020 – in fact just as the first Covid-19 lockdown happened

– we at SYSTRA UK handed over a major overhaul of the station's lighting and infrastructure to Network Rail, a transformation that including the installation of a dynamic lighting system to the main concourse area, which we believe to be one of the first tuneable circadian lighting systems supplied to a major public transportation space. On top of this, the station now boasts an innovative, highly transparent ceiling system to harvest daylight and save further energy.

To understand the scheme, you have to go back to October 2018. We were at that point approached by Network Rail, which was keen to revamp and update a station that had by then begun to look and feel dated. Network Rail was especially keen to bring the main concourse area into the twenty-first century, with new lighting a key part of an

over-arching £161m redevelopment.

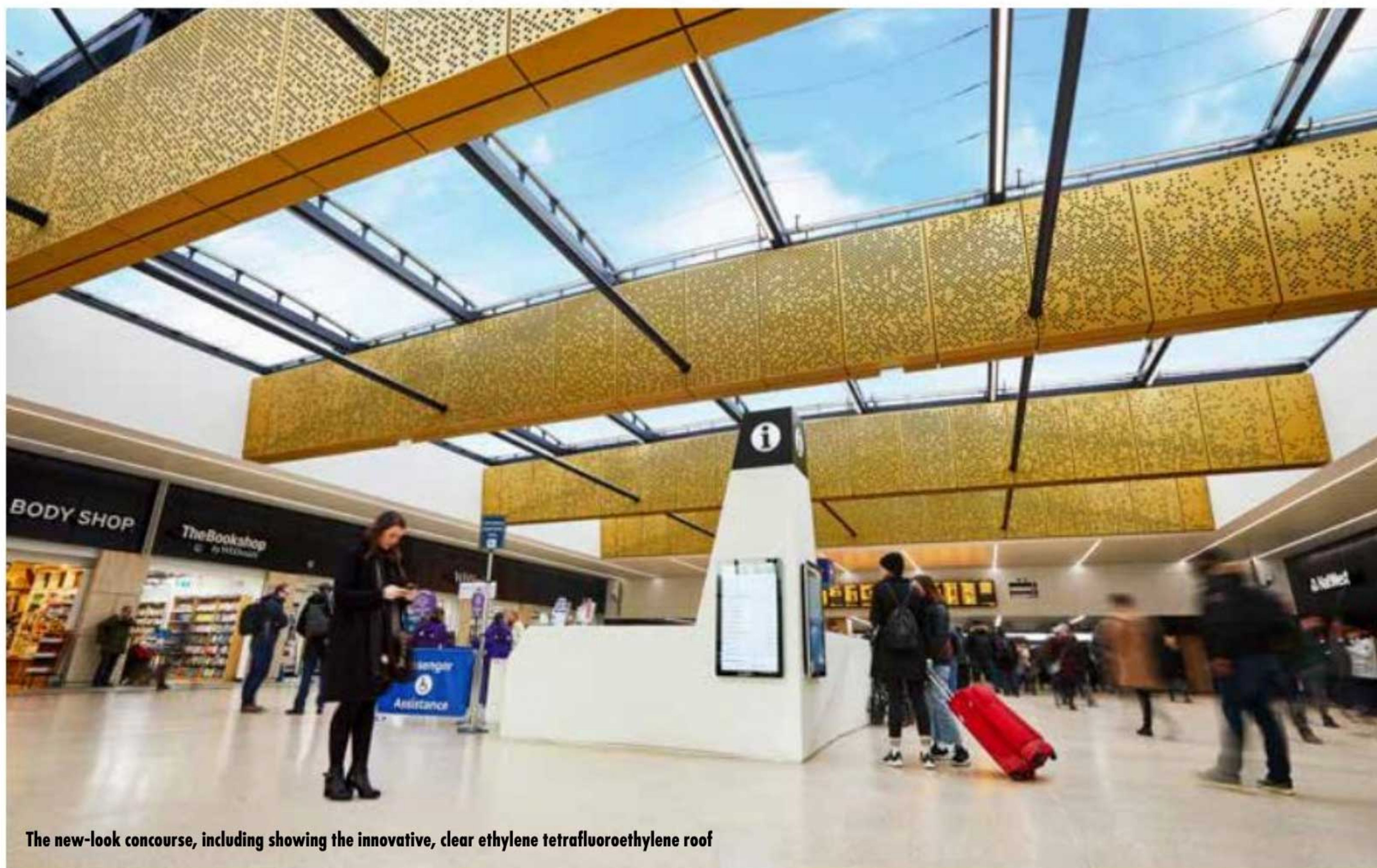
One initial challenge, however, was that Network Rail wanted the project completed by September of the following year (in other words, 2019), which was extremely tight, given the quite complex and lengthy quality assurance processes you would normally expect with a project of this size and scope.

For example, design is developed in accordance with a robust framework of design assurance with critical reviews at key stages. For very obvious reasons, given that you're dealing with safety-critical environments, everything has to be agreed and accepted before procurement can commence. The process is robust and for major interventions the programme for design and client review can be a significant consideration, so to go from a blank sheet of paper to

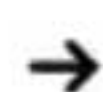




## Transport hub lighting



The new-look concourse, including showing the innovative, clear ethylene tetrafluoroethylene roof



completion in barely a year was always going to be challenging.

One reason for the tight timeframe was that Network Rail was keen for the work to be completed in time for the UCI Road World Championships men's road cycling race, which was due to finish in Leeds that September – and therefore the city, and its train station, would be in a world spotlight. Another challenge, naturally, was that the station was going to need to remain fully operational throughout the project; we would need to be working around (and, in fact, largely above) the millions of passengers streaming through each day.

When we started to look into things in detail, it was clear the station infrastructure had not been updated in decades. For example, it still had a wooden roof. The lighting, too, was extremely dated. It was all T12 fluorescent tubes that had been there for a very long time; it hadn't even got as modern as T8 by this point; it was real old inch-and-a-half lengths. The orientation was also not at all conducive to wayfinding.

We had a three-week initial design period, which was, again, quite a tight turnaround. We quickly put together a Relux model to be sure we could get the 200 lux Network Rail required on the concourse floor, which is a Network Rail requirement for station concourse areas. Within three weeks from the initial discussions, we had a full 3D, fully co-ordinated BIM model in Revit. The

progress of SYSTRA architectural and structural design was terrific and certainly enhanced the chances of achieving accelerated services design.

I also, of course, ought to mention the immense support we got from Jerry Barnard, formerly of RIDI Lighting, which supplied the luminaires for the project (but now running his own business JFB Lighting), of which, again, more in a moment. We knew that, if we were to have any chance of completing in September 2019, we had to get to a detailed design stage within 12 weeks, so it was all a bit of a gallop.

Within this, the procurement for long lead time elements was accelerated to meet the ambitious timescales, and therefore co-ordination of the design had to consider detailed interfaces much earlier than traditional design. On top of this, provision needed to be made in the design for a steel structure that would allow flexibility for a luminaire that had not yet been selected; this was crucially important to reduce time on site and reduce the amount of working at height.

To keep the concourse operational, the main contractors (Colt Construction) built a crash deck beneath the roof and above the operational concourse. This provided horizontal separation between the passenger and the workforce. This was a feat of engineering in itself as the supports for the crash deck had to be coordinated with a Victorian arch structure supporting the concourse floor! This

allowed the team to work above the crowds below, to take the old roof off and keep things watertight while the passengers went about their day underneath. Nobody walking through the station could see what was going on above their heads; it was a waterproof crash deck.

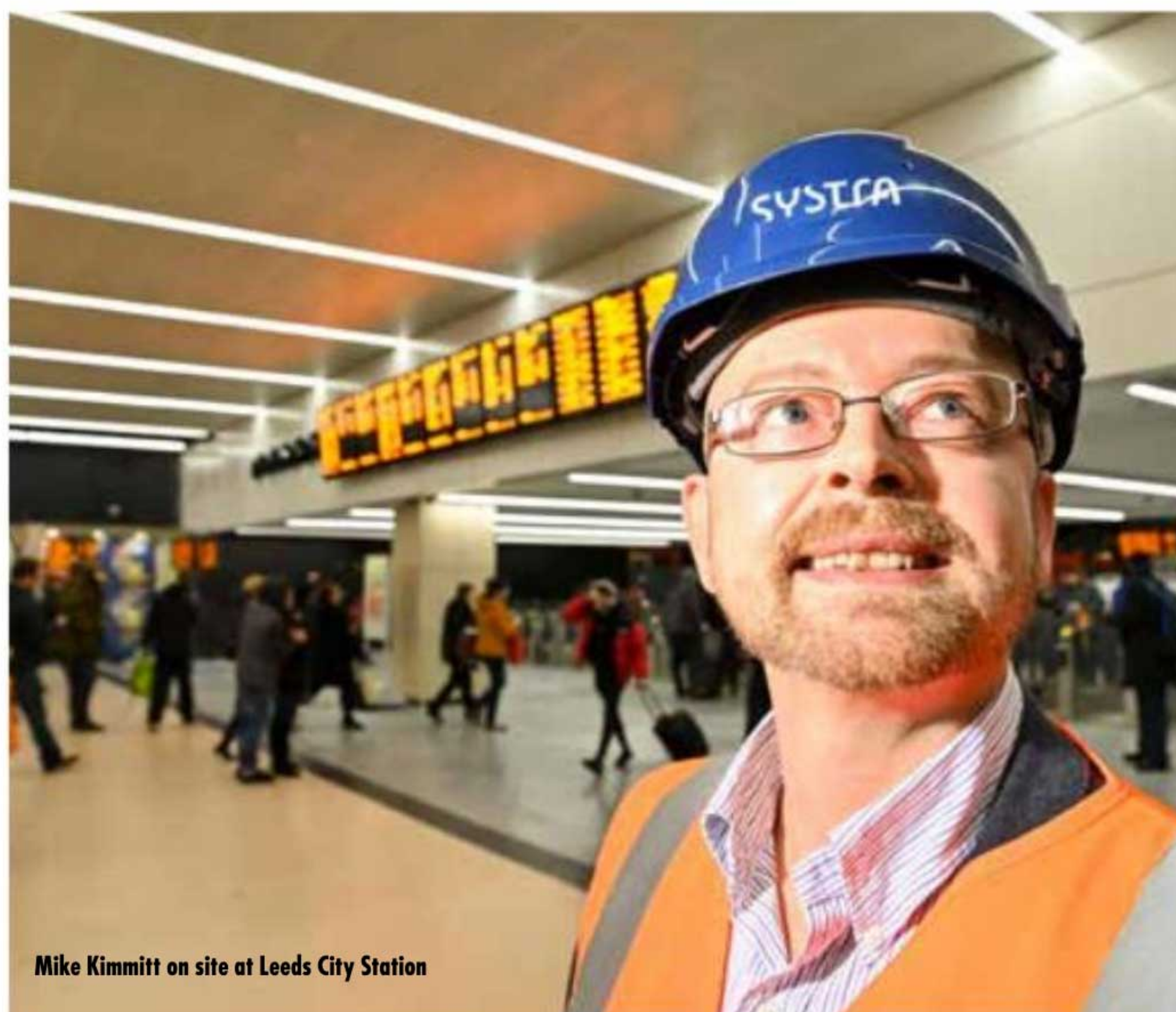
For the roof, the architectural design concept utilised ETFE (ethylene tetrafluoroethylene), which is a fluorine-based plastic. This results in clear inflatable pillows, much like you see on Cornwall's The Eden Project, which are kept inflated through a fan system. The use of ETFE allowed us to maximise the naturally occurring daylight coming into the station, and therefore complement the human-centric circadian rhythm LED lighting (which I will come to shortly). The main acoustic feature beams that run across the station concourse were finished in a dramatic gold anodised-like finish, again accentuated by the colour tones of the tuneable white light.

### EXTRUDED LINEAR LIGHTING

So, what about the lighting? The majority of the lighting is using a RIDI Lighting luminaire called 'Venice'. These extruded linear ranges in tuneable white LED were integrated into various aspects of the ceiling system at high and low levels. Natural lines were created inside the concourse to encourage 'flow of traffic' and wayfinding through the space, subliminally encouraging passengers to move in the direction of their departure or



## Transport hub lighting



Mike Kimmitt on site at Leeds City Station

→ arrival gate. The higher-level lines were integrated into the structural beams while, in the external canopies, IP-rated versions were supplied to maintain the visual aspect. At lower levels, lines of light were set into the plasterboard margins outside the retail outlets.

One advantage of the Venice system was that we could get it in long lengths that simply clipped together, so the speed of installation was much faster. This was critical because of the tight timeframes we were working to. The LED gear trays all just clicked into the extrusion; we wired into the extrusion and then clipped all the trays in; it was great.

### FULL CIRCADIAN LIGHTING

The next important element to discuss is the fact this is a full circadian lighting system and, as I say, we believe a first for a major public transportation space. What do I mean here by 'circadian'? Simply, that it can change colour temperature from 2700K up to 6500K during the day, and is pre-programmed to mimic the natural daylight coming into the space (of which there is a lot more now too because of the glazing and ETFE).

A programmable Control 3 Dali control system, again from RIDI Lighting, sets the parameters of the circadian rhythm for its specific location and therefore adjusts precisely to the daylight hours at any specific time and date in the year. The system also meets the demands of the energy control needs in the core areas and controls the energy usage in the main station space. Even the lighting in toilets is programmed to dim to

20% when they are not occupied.

As well as wanting the project completed very swiftly, Network Rail was keen to give the station something of a 'wow' factor, and I think the circadian lighting does just that. I live in Leeds myself and so can vouch for it from my own personal experience. I was recently asked to do a site survey to London, which meant catching an early-morning train. As I walked through the station the lighting was at a high colour temperature of 5000K, so all very bright and fresh.

But as I arrived back – at around 8pm – everything had been toned down to much warmer white, about 2700K, and the transformation of the space was something to behold; it felt completely different as I walked through the station. It was like a warm hug as I got off the train. Obviously, for some people, if they're rushing to catch a train or just in the station for a short period of time, they're unlikely to notice that much difference, but the difference is there. It is also important to remember that, while it is a transient space for some, for others it is their working space or a space where they may be spending a period of time while waiting for their train.

Although the project was successfully completed in time for the UCI Road World Championships in September 2019, the final commissioning of the lighting controls required some fine-tuning and was only completed in January 2020. As highlighted at the beginning of this article, the whole scheme was therefore only handed back to Network Rail just as Covid-19 hit, and passenger numbers disappeared.

That has meant we've been unable, so far, to carry out any post-installation passenger or staff market research. But it is something we intend to do once things are back in full force. We intend to gauge whether people feel the space is different to travel through or work within or whether, say, there has been any change in staff absence rates, even though that may be difficult to gauge because of the effect of Covid-19.

### LEARNING POINTS

Finally, what learning points did we take away from this project? For me, probably the biggest one was how everyone pulled together so effectively, how we all worked collaboratively to deliver what was a complex and innovative project in such a short space of time, especially as it had to secure everyone's buy-in every step of the way. Both Network Rail as the client and us at SYSTRA UK as the contractor (and all partner contractors) had to embrace innovation, and the one-team approach on the project was the correct environment for innovation. At every stage my counterpart at Network Rail was involved in the decisions, every sketch, every little idea that we were sharing on a weekly basis, rather than waiting for design submissions in that traditional manner, so the engagement was amazing.

At a practical level, I remember when the first run of luminaires went in, I was up on the crash deck with the electrical contractor (Mark Costello of JSC Electric). We were faced with this massive kit of parts in a container; there was half a kilometre of this continuous lighting up on that ceiling. They were all various lengths to tie in with steelwork dimensions. So, it was like a massive jigsaw puzzle without the lid of the box in front of you at times – but we did it! We hope returning Leeds commuters feel equally positive about their new-look, new-feel terminus.



Mike Kimmitt is principal lighting engineer at SYSTRA UK

### FIND OUT MORE

For ILP members who wish to find out more about this project, there is a time-lapse photography movie of the lighting as it changes colour temperature, available to view on the RIDI website, at <https://ridi-group.co.uk/project/leeds-station/>. There is also a video that can be viewed on YouTube, at [https://www.youtube.com/watch?v=nGy\\_SlGNukg](https://www.youtube.com/watch?v=nGy_SlGNukg)

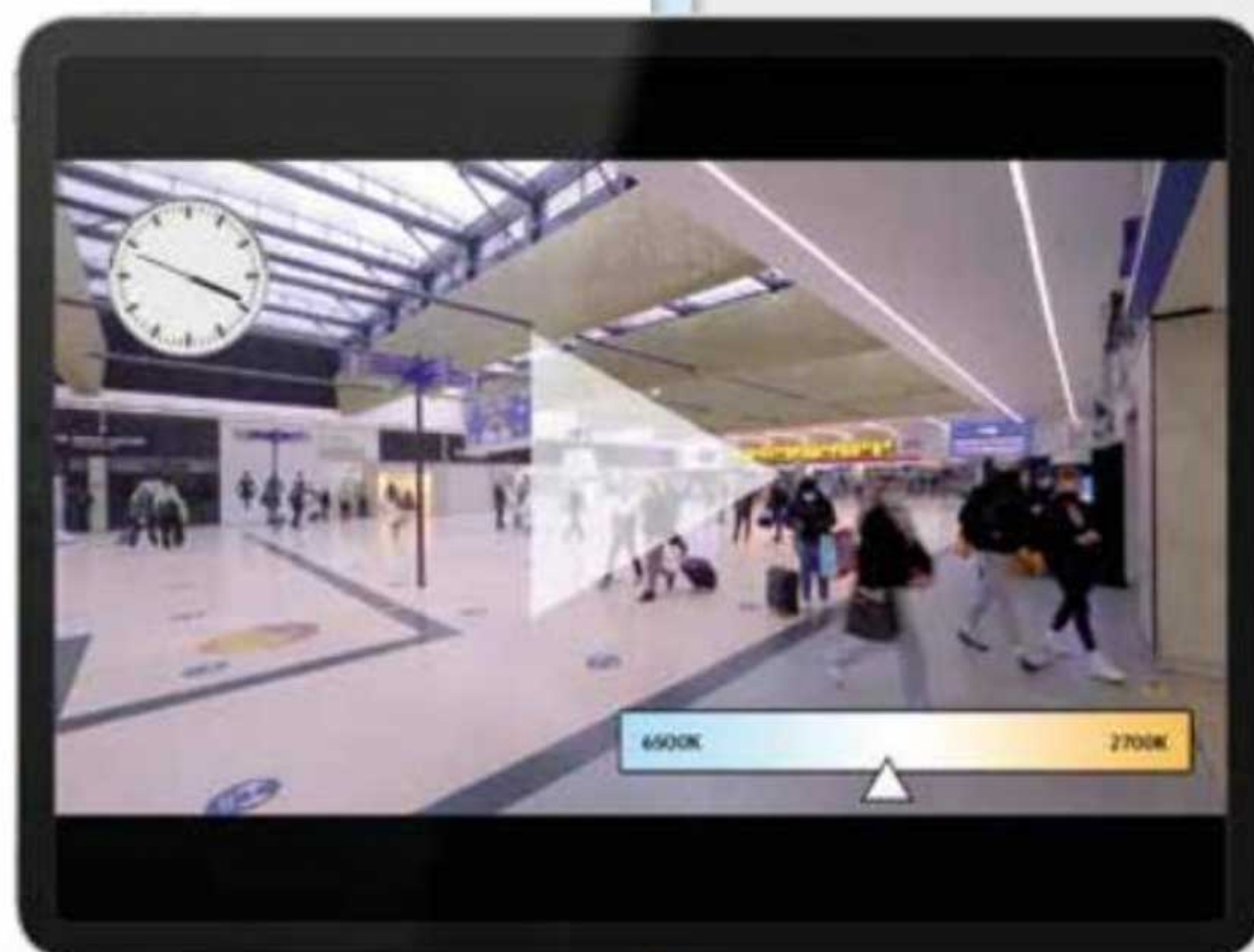


## Lighting and Controls by RIDI Group UK

RIDI Group UK are proud to have supplied our VENICE tuneable white luminaires and Control<sup>3</sup> lighting management system to this innovative project at Leeds station.

Watch the timelapse video showing the Circadian system changing throughout the day and find out more about our luminaires and controls at

[RIDI-GROUP.CO.UK/LEEDS](http://RIDI-GROUP.CO.UK/LEEDS)



Scan to watch the video

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