HOW THE COLOUR OF YOUR RACKING CAN CUT YOUR ENERGY COSTS

Graeme Shaw, Technical Application Manager at Zumtobel Lighting looks at the relationship between light, colour and energy resource within a data centre application and the direct impact this can have on reducing energy consumption in Data Centres.

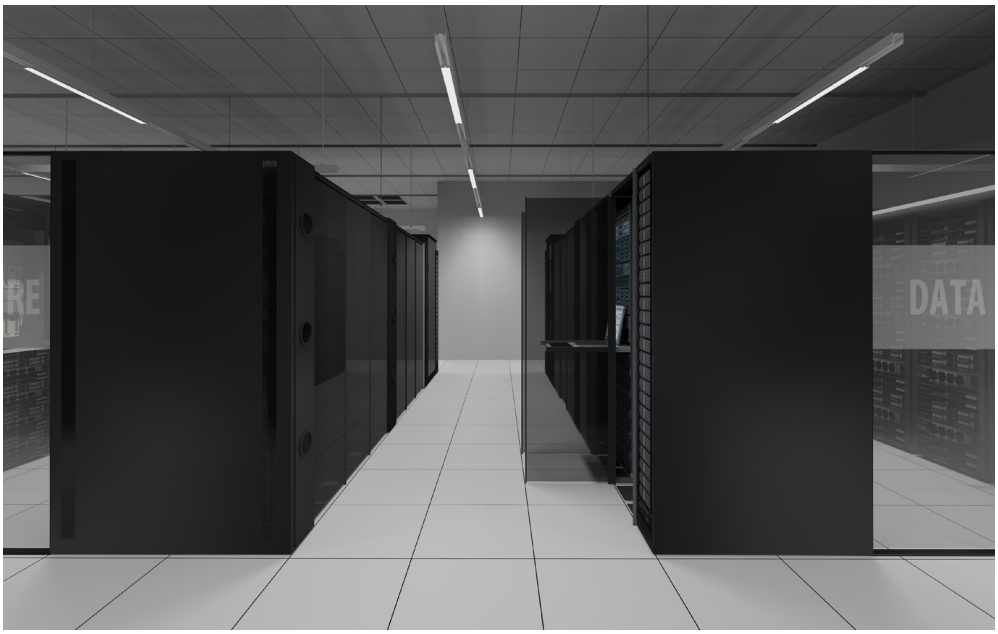
For data centre operators, energy efficiency is the primary objective, as any specifier working on a mission critical facility knows to be true. But what if you knew another way to optimise the efficiency of your facility and cut your costs without purchasing more products? After all, any positive impact on your PUE must be a good thing, right? Well, those extra savings may just be found in a place where you least suspect. In fact, the colour of racking has a direct impact on a data centre's lighting energy consumption and, ultimately, the operator's bottom line.

Good lighting quality is required for a variety of reasons, but perhaps the most critical reason is to enable technicians to read data displays and legends on equipment in order to make accurate observations and changes. When light shines on a black surface, the colour appears saturated and absorbs more lumens. White, on the other hand, has a significantly higher reflectance value, meaning more light is distributed throughout the space and, crucially, requires a lower lumen package to achieve the TIA recommended lux levels for data centres.

Black is the most common finish for IT equipment in data halls but, unfortunately, this colour actually works against producing an optimised lighting design within a data hall. This is because, to overcome the inefficient light reflectance of a black surface, the only solution is to use more light fittings, which in turn, leads to a higher capital and operating cost.

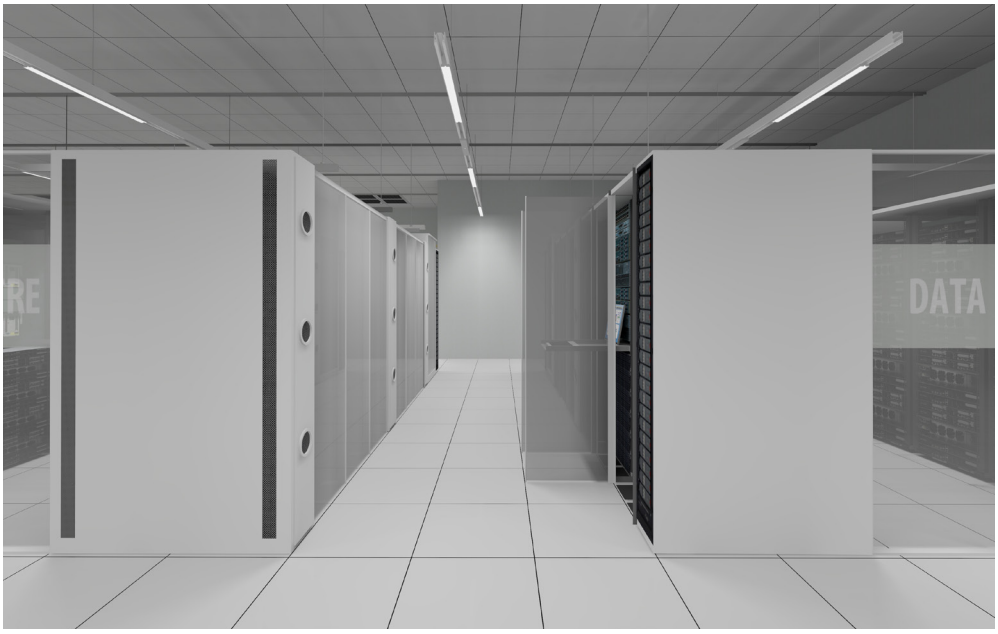
THE SOLUTION

Development and operating costs can be reduced during project design stage if the colour of IT equipment/racking is specified as white rather than defaulting to the industry standard, black. This would represent a 37% reduction in the number of luminaires required at initial install coupled with a 37% lifetime reduction in the lighting system power usage.



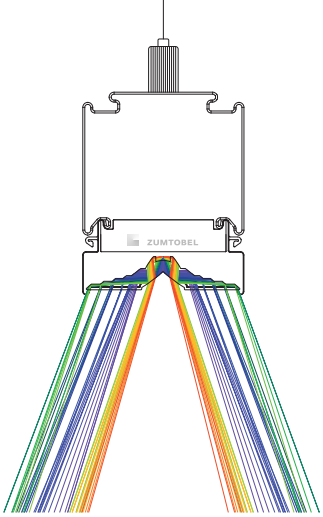
Model 1 - black IT equipment

Equipment Reflectance	Av. Horizontal Illuminance	Av. Vertical Illuminance	Power per m²	Qty of luminaires
4% black	506 lux 0.6 uniformity	232 lux 0.33 uniformity	4.31	104/562 m²



Model 2 - white IT equipment

Equipment Reflectance	Av. Horizontal Illuminance	Av. Vertical Illuminance	Power per m²	Qty of luminaires
85% white	1009 lux 0.63 uniformity	718 lux 0.45 uniformity	4.31	104/562 m²



Conclusions

Model	Equipment Reflectance	Av. Horizontal Illuminance	Av. Vertical Illuminance	Power per m²	Qty of luminaires
1	4% black	506 lux 0.6 uniformity	232 lux 0.33 uniformity	4.31	104/562 m²
2	85% white	600 lux 0.45 uniformity	418 lux 0.44 uniformity	2.7	65/562 m²

The luminaires used in the modelling scenarios above are from the Zumtobel Tecton C range with 4000k LED & split optic technology, supporting enhanced illumination on vertical surfaces

CONCLUSION

If you were designing the interior of a data centre and chose to opt for white racking instead of black, the number of luminaires required could be reduced by up to as much as 37%. Additionally, there would potentially be another 37% of savings realised in the energy used for lighting. So not only do you save at the design stage where you need less light fittings to achieve the same lux levels, but you also save the energy which those luminaires would have consumed throughout their lifecycle. That's a lot of savings in both the short and long term.

As a lighting manufacturer which has supplied to many data centres, we are inevitably asked the question, 'why do I need so many luminaires?' and that's when we begin the racking colour conversation. Imagine if the walls of your home were painted black. Even with identical sources of natural and artificial light, it's the same principle. You require more luminaires to achieve the same levels of light.

Lighting may only consume a fraction of the total energy used within a data centre but its impact and cost savings go far beyond the cost of the lighting. In addition to saving energy and reducing costs, an efficient lighting system can offer data centre operators a solution to minimise maintenance and maximise safety.