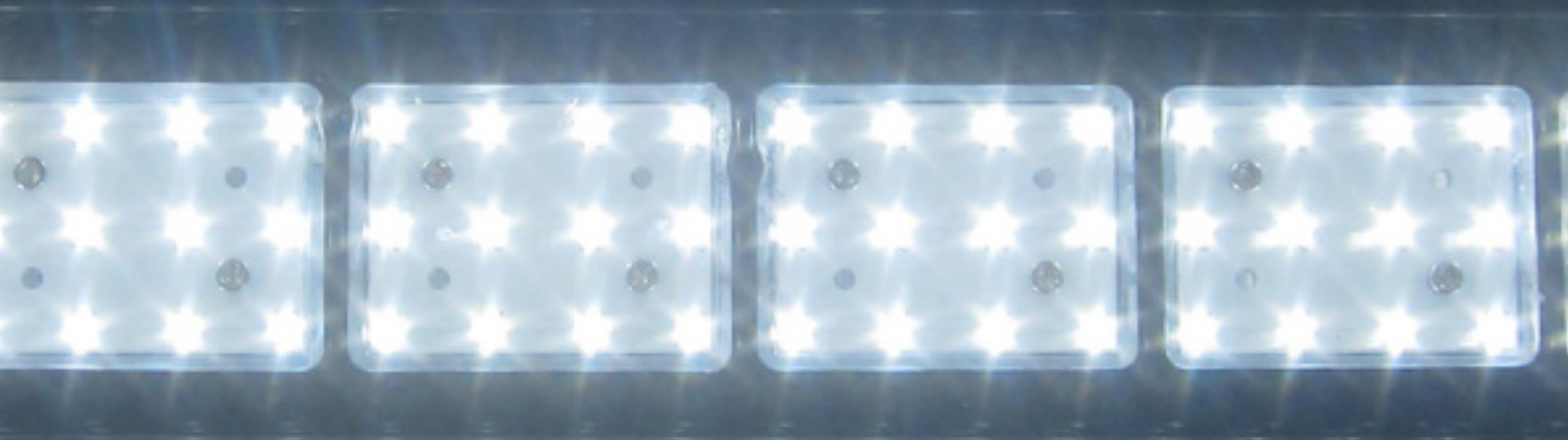


Raytec White-Paper How You Can Change a 5ft Fluorescent For a 4ft LED Linear...

In a previous article we identified how making the switch to an Ex LED Linear from a traditional fluorescent fitting can offer significant savings by reducing maintenance costs, providing a longer lifetime of 100,000+ hours, as well as producing a greater, more consistent performance for your application.

In this paper Raytec look at the feasibility of replacing a larger fluorescent fitting with a smaller LED fitting to enhance cost savings in switching to LED even further.



How You Can Change a 5ft Fluorescent For a 4ft LED Linear...

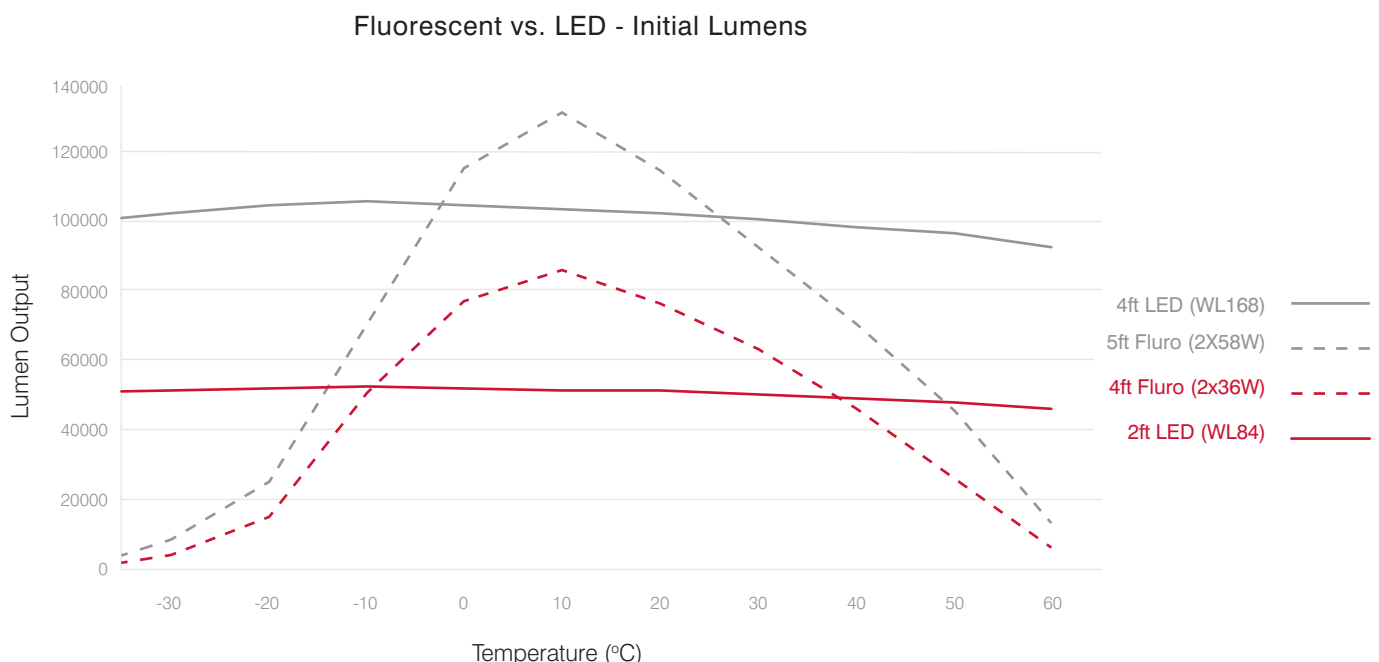
Making the switch to an Ex LED Linear from a traditional fluorescent fitting can offer significant savings by reducing maintenance costs, providing a longer lifetime of 100,000+ hours, as well as producing a greater, more consistent performance, making the decision to switch to LED a straightforward one. But did you know, because of the stable output of LEDs under a variety of temperature and operational conditions, by upgrading to LED you could save even more than you first thought by replacing existing fluorescent fittings with a smaller, more compact Ex LED Linear.

In a previous article we identified that replacing your existing 2ft, 4ft or 5ft fluorescent fitting with an LED fitting delivers improvements in terms of light output. In this article, we will look at the feasibility of replacing a larger fluorescent fitting with a smaller SPARTAN LED to enhance cost savings in switching to LED. Specifically we will compare:

- SPARTAN WL84 (a 2ft fitting) vs traditional 2x36W fluorescent (4ft fitting)
- SPARTAN WL168 (4ft fitting) vs a traditional 2x58W fluorescent (5ft fitting)

Using data produced by OSRAM (manufacturers of both fluorescent tubes and LEDs), and based on an installation of 20 fittings, information was compiled to represent a generic style of Zone 2 fluorescent, commonly known as 'boat fittings', usually manufactured with a GRP base and a polycarbonate cover. The LED technology is represented by Raytec's SPARTAN Zone 2 Linear fitting.

1: Light Output at Time of Installation

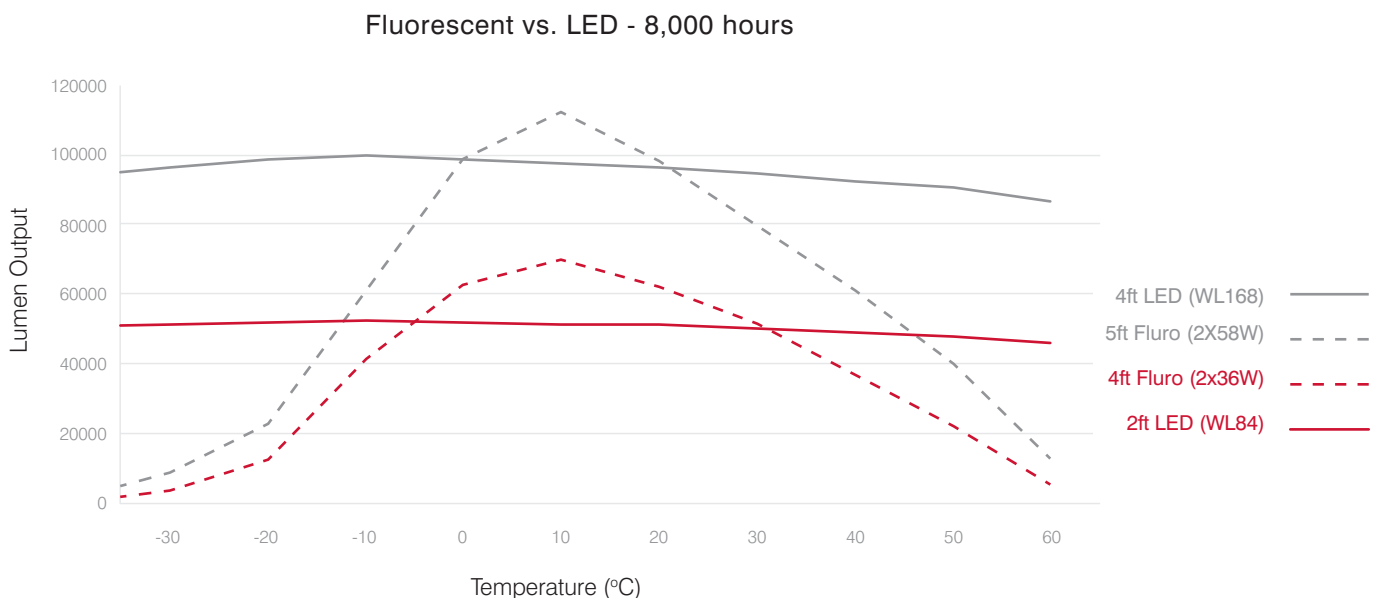


The first performance comparison looks at the output from each luminaire at the date of installation – the first time the luminaires are turned on. While the larger fluorescent fittings achieve higher output under optimum operating temperatures, under more extreme temperatures the LED fittings perform better.

Understanding the conditions of your application should help you better identify the benefits of using an LED luminaire over a fluorescent fitting. Although the fluorescent fitting will initially perform better under a narrow range of average temperatures, if an application is exposed to more extreme temperatures then LED could provide superior performance from day one.

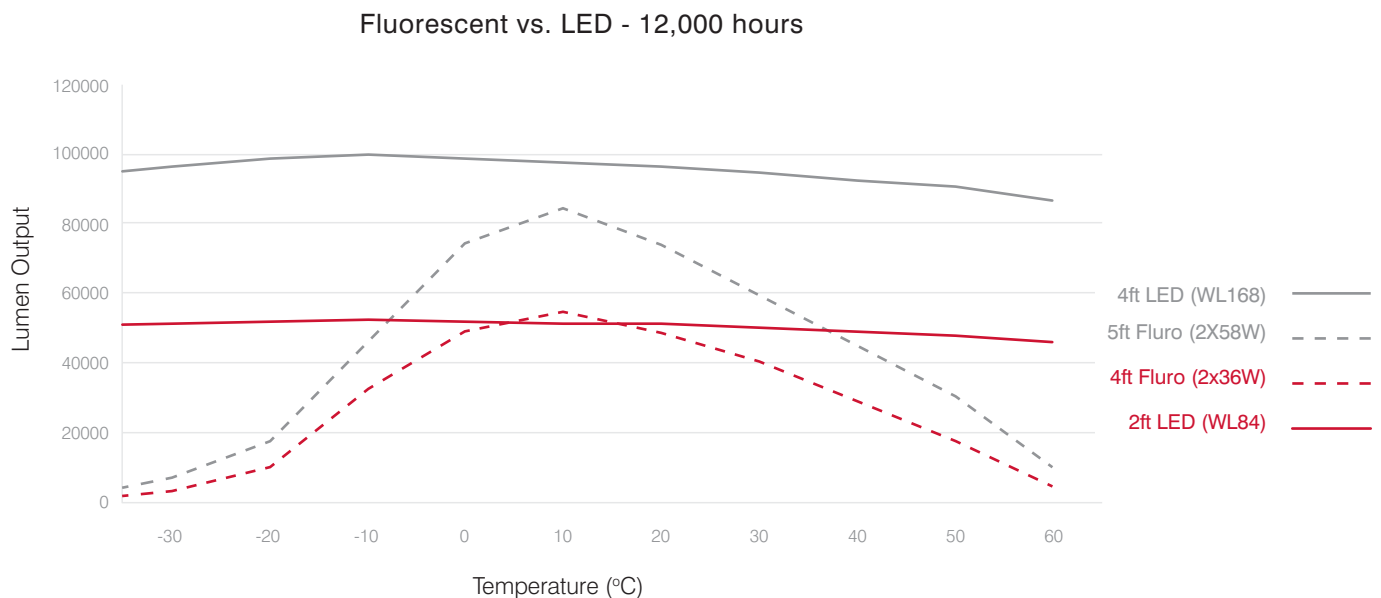
While this initial comparison shows light output at date of installation, the real advantages of LED will develop over a longer period of time due to the rate of degradation from a fluorescent fitting compared to an LED luminaire. This is something which we explored in our 'LED vs Fluorescent' white paper. What is more important than initial light output is how the fittings perform over the duration of their life. We will look at this in more detail in the graphs to follow, comparing performance at 8,000, 12,000 and 16,000 hours of operation. The first interval we have looked at is 8,000 hours, almost 1 year of constant operation.

2: Light Output after 1 Year



After 8,000 hours there is a significant degradation in the performance of the fluorescent fittings. In contrast, the LED SPARTAN has maintained an output almost identical to the first graph thanks to a near 0% failure rate and virtually zero degradation. After 8,000 hours the fluorescent's performance advantage has diminished significantly; for the 2x58W (5ft) fluorescent, any performance advantage over the SPARTAN WL168 (4ft) now only exists in the most optimum of conditions.

3: Light Output after 18 Months



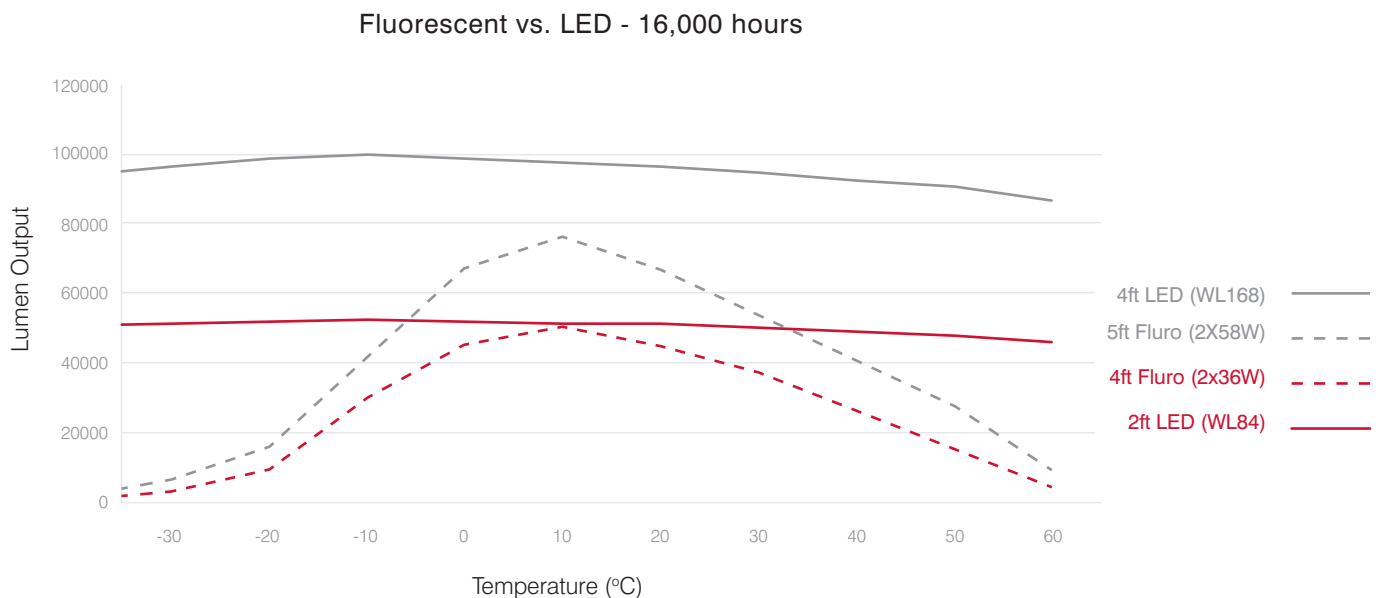
Fast forward around another 6 months of constant operation and the degradation of the fluorescent fitting has continued to drop at a significant rate. Even in the most optimum of conditions the fluorescent fittings have lost 37% of the total lumen output across the installation, compared to the LED fittings which have seen just a 6% reduction. The 4ft LED luminaire now significantly outperforms that of the 2x58W (5ft) fluorescent, proving the viability of upgrading an existing fluorescent with a smaller LED fitting and which has a lower lumen output than would normally be expected from a standard retrofit. With the level of performance after 18 months a WL168 (4ft) now provides superior light output in all conditions over a 2x58W fluorescent (5ft).

The performance of the 2x36W (4ft) has also dropped further, outperformed by the 2ft LED (WL84) unit in all but a very narrow temperature band. Although it may take a little longer before the WL84 LED unit outperforms across all temperatures, the difference in performance, at this relatively early stage in the products lifecycle, is minimal.

SPARTAN's CoolExtrude™ thermal management technology ensures a cooler LED operating temperature, delivering class leading energy efficiency



4: Light Output after 2 Years



After 16,000 hours we can now see the further degradation of the fluorescent fittings. The 2ft (WL84) LED luminaire is now outperforming the 4ft fluorescent fitting, providing superior light output in virtually all conditions. This shows the increased performance and greater light levels which can be achieved with LED, and further supports the viability of being able to upgrade an existing fluorescent with a much smaller LED fitting. The performance gap of the 4ft LED (WL168) compared to the 5ft fluorescent (2x58W) is now even more pronounced, with the LED providing an increase in performance of at least 13% under any conditions.



End of life fluorescent tube showing signs of degradation

Conclusion

Although the fluorescent fittings produce a higher output from new, looking at performance over a 16,000 hour period has shown a significant degradation in output of the fluorescent fittings. In contrast the LED fittings maintain an output almost identical to the first graph thanks to a near 0% failure rate and virtually zero degradation. With this in mind, it means that in terms of light output, a 2ft LED (SPARTAN Linear WL84) can effectively replace a 4ft fluorescent (2x36W), while a 4ft LED (SPARTAN Linear WL168) can replace a 5ft (2x58W) fluorescent. So now we know the feasibility behind it, what does that mean in actual terms?

Simply put, this ability to use a smaller LED equivalent saves costs. At the start, it provides savings on initial purchase price; and an installation of LED linears can be cheaper than an installation of comparative fluorescent fittings, based on purchase price alone.

However, the biggest savings to be made are the savings in energy. Let's put this into context using the current energy price in the UK as an example. The current unit price in kWh is 9.397 pence. A 2x58W fluorescent will provide 116W per unit, while the WL168 will provide 68W per unit; that's a saving of 48W per fitting. Therefore, across an installation of 20 fittings that's a saving of 9.02112 pence per hour, the equivalent of £2.17 per day, £15.19 a week, and £792.05 a year. Over 100,000 hours, which is the minimum expected life of Spartan luminaires, you would save an incredible £9,021.12 on a 20 luminaire installation.

Larger projects such as offshore drilling rigs, can experience even greater savings. For example, with an application of 500 fittings you can expect a saving of £2.26 per hour. That's an equivalent of £19,797.60 a year and £226,000 over the lifetime of the installation!

The switch to LED provides significant energy savings but there are also cost savings to be made with maintenance, transport and disposal – an LED fitting lasting for over 10 years without repair or replacement. Additionally, for applications relying on generators as a power source, freeing generator capacity has significant cost benefits to the end user.

To read more about the comparison of the types of technology and the advantages of LED in more depth, as well as the conditions of the data used in the analysis, download our White Paper '[LED vs. Fluorescent](#)';

Raytec have a full range of retrofit solutions to replace 2x18W, 2x36W and 2x58W fluorescents. For enquiries or more information phone us on [+44 \(0\) 12670 520055](tel:+4412670520055) or email us at hazsales@raytecled.com



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