

Application Focus: Lighting for Land Rigs



Introduction

Land rigs are specialised drilling structures used onshore for extracting hydrocarbon assets like oil and gas from the earth. These rigs can be placed in unforgiving backdrops of extremely harsh and dry climates with potential hazards and strict safety regulations. In these areas, where precision and safety are vital, the role of lighting goes beyond illumination – it becomes a critical component of operational efficiency and risk mitigation. Specialised LED lighting is thus required for reasons beyond illumination.

Historically, fluorescent luminaires, were a common sight at land rigs but over time, fluorescent technology has revealed its faults and failures especially when catering to hazardous environments or difficult terrains. Fluorescents lose 40% of their initial lumens, resulting in less consistent light output **compared to LEDs**, which maintain their brightness without such degradation. Additionally, fluorescents have more failures due to their shorter lifespan in comparison to LEDs. These frequent failures necessitate a lot of maintenance. While some might argue that increased maintenance can be beneficial, in these challenging locations, it becomes costly and difficult to access.

LED lighting, on the other hand, provides a more reliable solution to solve many of the legacy problems of fluorescent lighting including safety, power consumption, levels of hazardous waste, and of course reduce on-going material and operational/maintenance costs.

Raytec are experts in LED Lighting and have an award-winning range of luminaires for hazardous areas. This application focus will talk about challenges in lighting for land rigs, the viable solutions, and Raytec recommendations.



The Challenges and Solutions

Luminaires for land rigs are installed in a range of areas varying from the engine room, mud, and diesel tanks, to mixing systems, workshop areas and accumulators. Managing these diverse and sensitive areas means investing in more resources. For this reason, rig owners have a greater responsibility now to create and maintain a conscious work environment. Let's explore this in more detail.

Withstand Hazardous Environments

Land rigs are often located in areas that are exposed to extreme temperatures (more than 40 degrees Celsius in the case of Middle East) and natural phenomena such as sandstorms, in which case the performance of a fluorescent will begin to deteriorate significantly. In contrast, an LED luminaire remains largely unaffected. Equipment installed in these areas can also fall victim to chemical attacks in the event of oil lubricant spillage, thereby permanently damaging the luminaires and making them unsafe. These areas are thus considered hazardous environments that require purpose-designed equipment, particularly lighting, as it is crucial for ensuring safety.

Some hazardous area luminaires are manufactured from GRP (Glass-Reinforced Plastic/Polymer) that may make them vulnerable to chemical attack and will also degrade over time in high temperatures. In contrast, Raytec LED luminaires feature high-quality aluminium construction, with a small high-strength polycarbonate lens, making them durable and suitable for hazardous environments. A good luminaire for land rigs doesn't just need to be suitable for hazardous areas, it also needs to be extremely tough. Raytec holds global certifications, including ATEX, IECEx, UKEX, and compliance with North American standards. They also boast an IP66 and IP67 rating to mitigate dust and sand infiltration.

Prolonged exposure to the sun, or UV (ultraviolet) rays, is common at onshore locations, which can cause the lens of the luminaire to crack. When lighting is installed in external areas, this continuous exposure to UV may cause issues for some luminaires, particularly luminaires made from GRP which can degrade and become brittle when exposed to UV over long periods, causing issues around maintenance and structural integrity of the housing. In contrast, Raytec LED luminaires' high-quality aluminium construction makes them best suited to even the harshest environments.



High Power Consumption

Due to the expansive size of land rigs, it is crucial to ensure uniform and even illumination. This not only facilitates smooth workflow and operations but also plays an important role in upholding overall safety and security standards. Traditional luminaires, such as fluorescent lighting, lack smart functionalities, adaptability, and sufficient power, demanding additional deployments and resulting in heightened energy consumption and costs.

Moreover, with drill rigs relying on power from generators, a shortage of generating capacity can pose a significant challenge and incur considerable expenses. An alternative approach involves reducing the consumption of existing electrical equipment to free up capacity for other needs.

A large offshore production platform may have over 2,000 fluorescent fittings installed and if a 2x36W (72W) fluorescent can be replaced by a 32W SPARTAN Linear WL84, it could mean a massive saving of over 80Kw/h. Even smaller, on land, applications where there are fewer units installed, the saving is still significant.



SPARTAN Linear WL84 Emergency

Hazardous Waste

The disposal of luminaires as hazardous waste poses yet another challenge for land rig owners. Traditional luminaires use fluorescent tubes, which once burnt out, become hazardous waste due to the mercury content that requires special recycling processes to avoid potential harm to the surrounding environment, wildlife, and human health.

In contrast, LED lighting solutions contain no toxic content and are therefore not considered hazardous waste. They can be disposed of with general recycling waste.

To reduce hazardous waste from High-Intensity Discharge (HID) and mercury lamps, land rig owners should consider replacing old, inefficient mercury lamps and ballasts with new LED lamp technology. This upgrade provides higher light output for longer durations at a significantly lower running cost. Additionally, rig administration should consider replacing fixtures using metal halide (MHD) or high-pressure sodium (HPS) lamps with the latest low-powered LED technology fixtures like the SPARTAN LED technology that ensures energy efficiency, long lifespan, and instant-on capability, crucial for continuous operations.

Light Distribution

Given the expansive nature of land rigs, certain areas may require higher levels of illumination than others.

Raytec lighting addresses this issue during the lighting design phase of the project, ensuring a uniform level of light to a level specified by the end user, guaranteeing even illumination across the rig. Utilising various beam patterns, Raytec luminaires are available in a wide selection of beam angles to deliver targeted light where it's needed most, and minimising wastage, reducing light pollution, and giving the most economical solution to the end user.

Ease of Maintenance

Rigs situated in remote locations pose logistical challenges for long-term management and maintenance. Moreover, prolonged exposure to the sun and its UV rays presents a continuous threat, as UV exposure can degrade certain materials over time thereby requiring supervision.

Fixtures can also accumulate significant dirt, requiring extensive cleaning procedures that involve removal, cleaning, reinstallation, and tagging out of each unit individually. And if left unattended, fixtures have the potential to deteriorate and pose safety risks. Removable protective films on SPARTAN fixtures allow for easy cleaning, reducing the need for complex disassembly procedures.

Raytec lighting solutions excel in maintenance due to our innovative design and features that prioritise ease of access, safety, and efficiency. The modular designs allow for individual component servicing without extensive disassembly, while external access to the power supply simplifies repairs and replacements. The SPARTAN High Power Flood and Bay range features a removable, remotely placed Power Supply Unit (PSU), enhancing serviceability without disturbing the main fixture. Additionally, Raytec's remotely controlled luminaires enable adjustments and diagnostics without physical access, minimising downtime and reducing labour costs.



Flood
Luminaire



PSU
Module

Reliability

a) Vibration Resistance

Land rigs are subject to high levels of vibration, which can damage traditional floodlights or fluorescent lamps. These lamps often need frequent maintenance, especially in crane applications, due to their delicate filaments and components that can break or become dislodged. In contrast, LED lighting is inherently more resistant to vibration than traditional lighting and Raytec also offer dedicated LED lighting for cranes, such as our SPARTAN luminaires, which are naturally resistant to vibration due to their robust design, strong build, and damping technology.

b) Enhanced Safety with Secondary Retention Points

Safety is a paramount concern in hazardous area lighting applications. To enhance the safety of our luminaires and thereby the projects, each unit is equipped with secondary retention points. These two anchor points enable the attachment of safety cords, providing an additional layer of security. This feature helps luminaires remain securely in place even if the primary mounting system were to fail, thereby preventing potential accidents or damage.

c) Lightweight and Durable Design

Most drilling vessels are designed to be moved from location to location. Frequent relocation of rigs necessitates lighting solutions that are both lightweight and durable. LED luminaires are significantly lighter than their traditional counterparts, such as fluorescent lamps. This reduced weight makes the installation and repositioning of lighting fixtures easier and less labour-intensive. Additionally, the SPARTAN range prides itself in being rugged and durable with UV-stabilised polycarbonate lens and IK10 rating, making it nearly impossible to break. This robust construction ensures that the luminaires remain intact and functional, eliminating the risk of damage during movement and reducing the likelihood of operational delays.

d) Emergency Lighting

Land rigs can be complex and energy-exhaustive operations that require a stable and dependable source of power to ensure smooth operation. However, the electrical systems on oil rigs often suffer from poor power factor, leading to energy losses and low energy efficiency. The generators used to power drilling rigs can often be unstable, and a loss of power which disables lighting on-site will stop the rig, posing a major safety threat.

Raytec offers various emergency variants of their luminaires to ensure there is always light on-site even when power is interrupted. The standard emergency model ensures 25% output with a duration of 180 minutes. Additionally, there are options available for 50%, 75%, and 100% output variants across most products. This versatility ensures that appropriate lighting levels are maintained during power outages.

A luminaire with an emergency battery backup, which maintains output when mains power fails, is essential for any drill rig. [Emergency lighting](#) significantly increases safety on-site by maintaining light output during power outages, thereby reducing the threat of injury or incidents. Raytec's SPARTAN LED luminaires continue to operate at full light output for a particular duration during short-term voltage drops and strike instantly if power is lost, unlike traditional lighting technology which can take up to 15 minutes to restart.

Raytec's emergency luminaires are equipped with an Intelligent Emergency self-test feature. This involves a random test occurring every three months, rigorously testing the battery's capacity and the luminaire's overall condition. If the battery is not operating at full capacity, the luminaire can perform self-recovery to restore optimum performance. This ensures reliability and reduces the need for manual maintenance checks.



Sustainability

In addition to offering cutting-edge lighting solutions tailored for land rigs, Raytec prioritises sustainability and environmental consciousness. Our commitment is exemplified by the achievement of [carbon neutrality](#) in 2022 as well as 2023, a milestone that underscores our dedication to minimising environmental impact. Internally, Raytec has established a Sustainable Planet Team, tasked with implementing, and overseeing sustainability initiatives across the organisation. Moreover, Raytec actively invests in reforestation programs and other sustainability drives, further cementing our commitment to environmental stewardship.

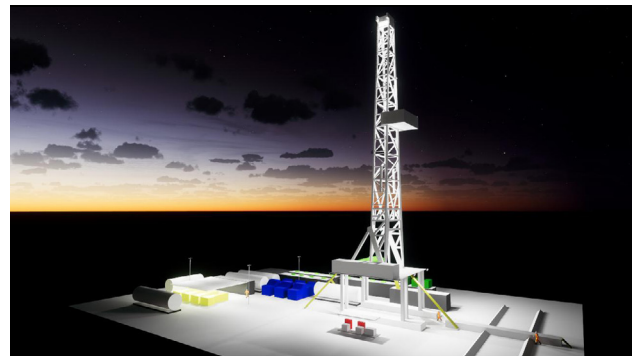
Lighting Design

When installing a professional lighting system, we always recommend using a professional lighting design service. A professional lighting design service provides the end user and installer with a detailed report that shows the lighting levels that will be achieved on-site. This ensures there are no surprises at the point of commissioning and acts as a guide during installation, reducing installation time. A good lighting design will also offer cost savings, both by reducing the number and size of luminaires used on-site and by lowering electrical consumption. All of this should be achieved while increasing the quality of light on-site.

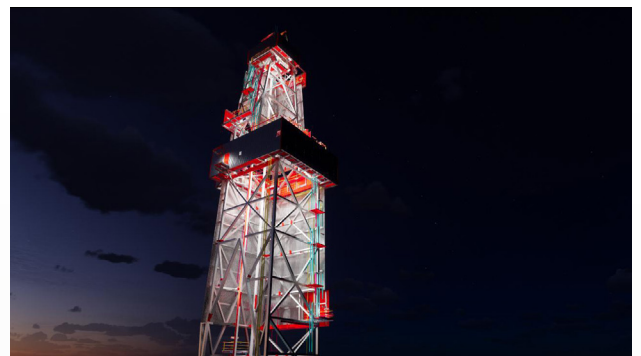
Raytec offers an award-winning, free-of-charge, lighting design service to all our customers – bringing your installation to life.

In 2020, Raytec won the HazardEx 'Best Customer Service' award for its Lighting Design Service – the success of this service comes from the clear benefits that Raytec's lighting design service offers including uniform illumination, increased performance, cost savings and acting as the perfect guide for installation.

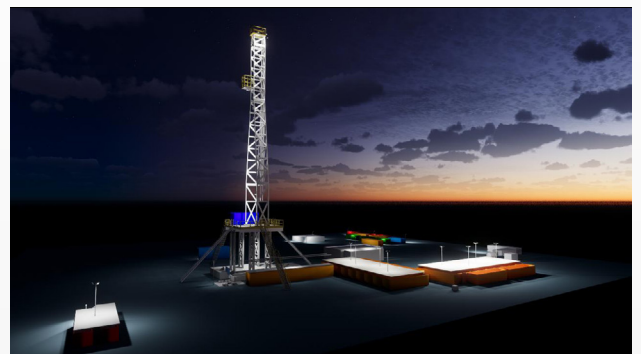
Getting your hands on this service is easier than you would expect. Depending on the complexity of your installation, Raytec can offer you a range of designs varying from simple to highly detailed, with the shortest turnaround time being just 3 days! ([Read more](#))



US LAND DERRICK



RIG MAST DETAILED



RIG LIGHTING UPGRADE

Conclusion

In addressing the unique challenges of lighting for land rigs, innovative solutions are needed to prioritise safety, efficiency, and sustainability. Rig owners encounter hurdles such as hazardous environments, high power consumption, disposal of hazardous waste, uneven light distribution, and maintenance reliability. LED lighting technology, exemplified by Raytec's durable and energy-efficient luminaires, offers a viable solution. Additionally, customisable beam patterns and optic choices ensure even illumination across the rig, enhancing safety and operational efficiency.

Collaborating with specialised partners for lighting surveys provides valuable insights into rig areas, facilitating informed decision-making and optimising lighting strategies. By implementing these solutions and leveraging partnerships, rig owners can effectively overcome lighting challenges, making the environment safe and productive for all personnel.

Explore Raytec's range of LED lighting for hazardous areas [here](#).

EXPLORE THE RANGE >