In brief, there are two methods of creating “white light” using LED devices and each method offers differing efficiencies and effects. The first is described by the manufacturing method called phosphor on die and the other by the effects method of mixing the three primary colours of red, green and blue to create white light.

Typically the manufacture of highly efficient LED lighting comes from coating a blue coloured or near UV light solid state diode device in a yellow phosphor coating. When electrical current is passed through the solid state chip the blue photons generated in the LED either travel through the phosphor layer without alteration or they are converted into yellow photons in the phosphor layer. The combinations of the blue and yellow photons combine to generate white light.

In a typical phosphor white LED manufacturing process, a phosphor coating is deposited on the LED die. The exact shade or colour temperature of white light produced by the LED is determined by the dominant wavelength of the blue LED or near UV light and the composition of the phosphor.

The phosphor white method offers much better colour rendering and is more efficient than white light created by red, green and blue white. Because of its superior efficiency and colour rendering capacity (typically Ra 70 to 85), phosphor white is the most commonly used method of producing white light with LEDs.

The thickness of the phosphor coating produces variations in the colour temperature of the LED. Manufacturers attempt to minimize the colour variations by controlling the thickness and composition of the phosphor layer during manufacturing.

Over time, the blue die and the yellow phosphor will degrade resulting in a shift in colour of the delivered light. However, with efficient design and thermal management in any LED fixture (luminaire) these effects are minimised to within typical overall life spans of 60,000 - 100,000 hours.