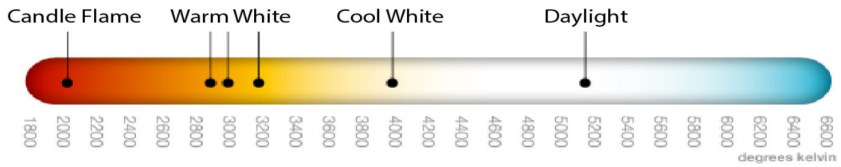
What is CCT ?

CCT or Correlated Colour Temperature is a number, expressed in degrees Kelvin (K) which represents the colour of a light source, it is equivalent to the colour emitted by a blackbody radiator when heated to that temperature. It is easier to communicate CCT rather than the chromaticity co-ordinates, therefore it is used as the means of specifying the colour of light sources.

The CCT values of common light sources typically range from 2700K to 6500K. The CCT value indicates the apparent "warmth" or "coolness" of the light. Light sources with low CCT values (2700K to 3000K) provide light that appears "warm," while light sources with high CCT values (4000K to 6500K) provide light that appears "cool."



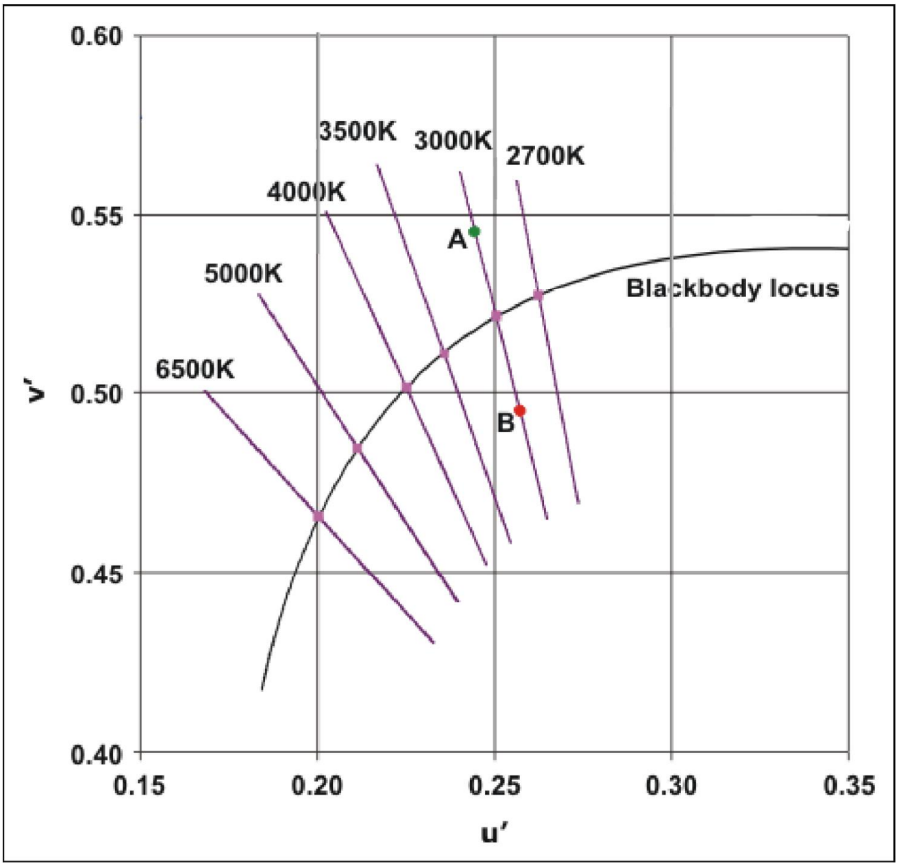
Typical Appliations of Various CCTs:

CCT	Terminology:	Applications:
2700K	Extra Warm White	Living Rooms, Bedrooms
3000K	Warm White	Living Rooms, Bedrooms, Hallways
4000K	Cool White	Kitchens, Bathrooms, Offices, Retail
5000K	Daylight White	Commercial, Retail, Art Studios

CCT Continued

Fig. 1 shows a chromaticity diagram with six temperature lines. The CCT of a light source can be determined from its chromaticity co-ordinates in relation to the temperature line, e.g. Point A represents a light source with chromaticity coordinates u' = 0.24, v' = 0.54, this point is on the 3000K temperature line, and therefore the CCT is 3000K.

Fig.1



You will notice that Point B with different chromaticity co-ordinates (u' = 0.26, v' = 0.49) is also on the 3000K temperature line, these two will look different to the eye. The light emitted by source A will look greenish-white, while the light emitted by source B will look purplish-white.

To address this problem a colour consistence system is used in conjunction with CCT. Colour consistency is the variation in the chromaticity of light sources, based on MacAdam ellipses.

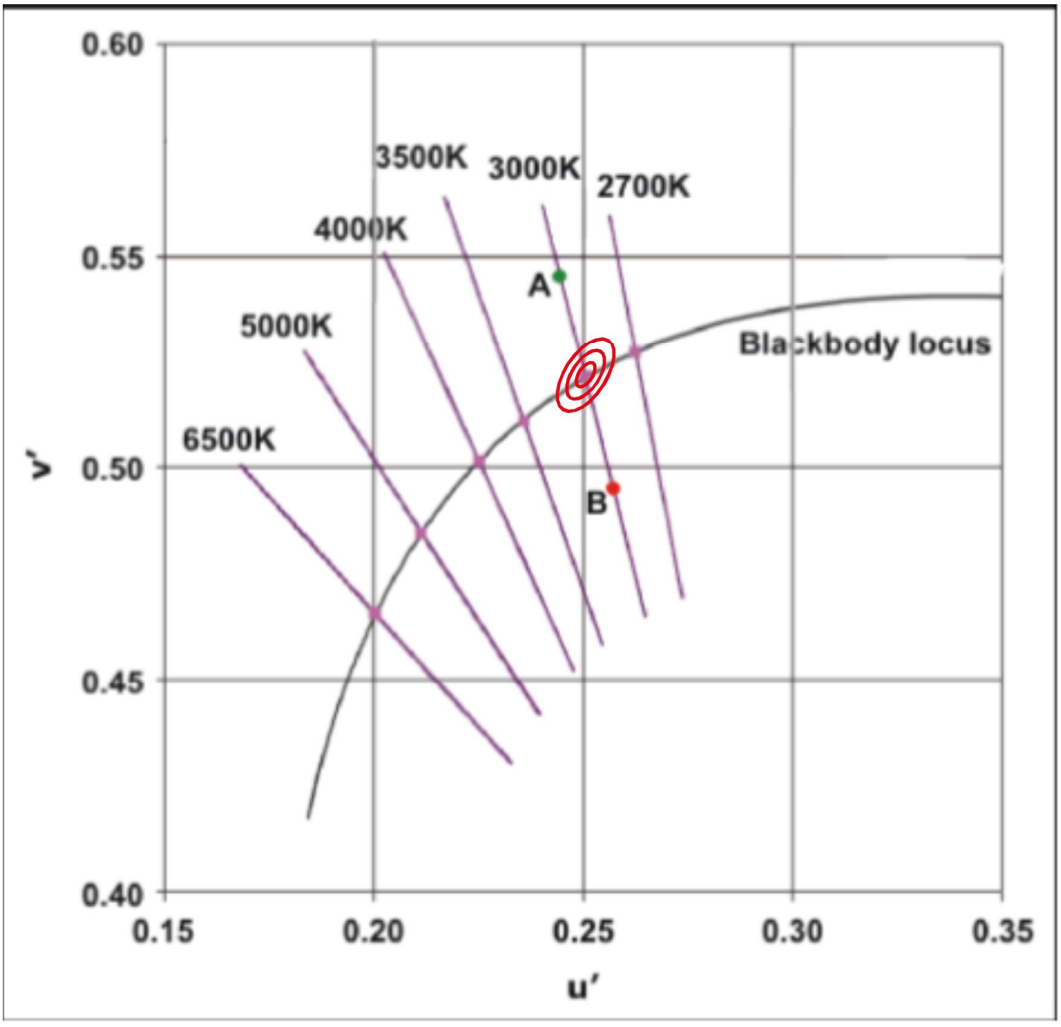
CCT Continued

David MacAdam showed that a just noticeable difference of the colours of a reference light and a test light formed an elliptical pattern in chromaticity space, centred on the chromaticity of a reference light, the average human observer would not be able to detect any colour difference of any light within the ellipse.

MacAdam ellipses are specified according to size i.e. 1-Step, 2-Step, 3-Step, etc. (a 2-Step ellipse is twice the size of a 1-Step ellipse and so on), they can also be specified as 'Standard Deviation Colour Matching' (SDCM), 1 SDCM is equivalent to 1-Step, for 3000K this is ±30K (u v ±0.0007).

Fig.2 is a chromaticity diagram showning 1-Step, 2-Step, and 3-Step ellipses centred around the ideal 3000K point.

Fig.2



When specifying the colour of a light source it is necessary to consider both the CCT and the size of ellipse which will give an acceptable colour consistence, i.e. 3000K 3-Step.