

This is a side view of a flash with flash diffusion material being the thick black lines. On the left the flash diffuser material is in a concave shape (inward circle round the target), and on the right the flash diffuser material is just flat.

When you use flash diffusion material like polystyrene, the flash diffusion material itself becomes the light source as far as the target is concerned.

The concave flash diffuser on the left gives more even flash light than the flat diffuser on the right. This is because there is no light falloff on the left (all the light travels the same distance) whereas on the right some of the light (on the very edges of the flash diffuser) has a longer distance to your target than the light in the centre. If the diffusion surface has uniform light then following the inverse square law of light there must be a difference in light intensity.

