



Guide to HD Optics

There is a new range of HD video-style zoom lenses, primes and cine style zoom lenses designed specifically for HD.

How are HD lenses better than SD lenses?

They are better than SD lenses in every way – improved barrel distortion, reduced chromatic aberration, lens ramping, focus breathing, speed and coatings and the difference if shooting HD, is both noticeable and justifies the cost differential compared with SD lenses.

Film-style lenses vs. video-style lenses

Conventional Digi Beta lenses are designed to be used shoulder-mount as opposed to on a tripod. As a result, they permit the camera operator to operate or 'pull' focus him/herself. This limits the focus adjustment on so called 'video-style' lenses to around 1/3 of a turn – very good for shoulder mount operation but not so good for drama.

Drama needs are quite different from ENG documentary shoots. Firstly, drama lighting tends to be low and moody requiring the camera to be frequently used with the iris wide open to minimise depth of field. Secondly, at this exposure, focus adjustment is critical, so the focus is frequently operated by a separate focus puller – their priority is to maximise focus latitude which is not possible on video-style lenses. As a result, a new range of lenses was created called 'cine-style' which are designed to have a much larger focus latitude (around 300 degrees or more) to enable critical focus control at wide-open irises. They are also designed to minimise focus breathing (zoom effect whilst focussing) and maximise performance at each fixed focal length, as opposed to compact zoom lenses which are designed for portability and performance. However, there are cinematographic zoom lenses (Canon HJ21x7.5 BIRS) which offer very similar optical performance to cine-style lenses but the focussing advantages of the cine-style lenses remain.

Primes vs. zooms

Zoom lenses offer HD performance over a range of focal lengths. This versatility comes at a cost – they are never as fast as their equivalent prime lenses (as the lenses contain more glass and the coatings are inferior), and they are never as good at the widest or the longest ends.

Prime lenses come in a set of 5 or 6 lenses of discrete focal lengths. Each lens is designed to be optically maximised at its particular focal length and is probably measurably superior compared to the equivalent prime in barrel distortion, lens ramping, chromatic aberration and lens breathing as well as being around a stop faster. The colour balance of the Canon and Zeiss zooms matches the Canon cine-style zoom lenses well (within 150K).

Whilst the prime lens is always going to be better than the zoom, it is important to emphasise that the zoom lens performance is still very good. Indeed, at VMI, it is a testament to how good the zooms are that out of 14 camera sets, we only own 2 sets of Prime lenses.

The Prime lenses come at a significant cost premium to the zoom lenses and the DoP must carefully balance the improvement in performance against the additional cost.

Paul Wheeler describes Zeiss lenses as "outstanding" but also describes them as "correct and clinical". Chris Titus King always demands Zeiss DigiPrimes for drama but most DoPs once they assess the performance of the Canon cine-style lenses, opt to use them for the entire production. Ultimately, what lenses to use are very much a question of personal choice and budgetary choice.

Back focus drift

It used to be the case the shooting HD meant frequent checking of the back focus. Lighter-weight lenses are now available which help to reduce this problem – the Canon HJ11x4.7 wide angle lenses need no support in order to avoid back focus drift. The larger lenses, such as Canon HJ21x7.5KLL must be used with supplied custom-designed lens support brackets in VMI kits. They ensure that the camera and lens are securely fitted and

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back-focus drift is greatly reduced – so much so, that this is no longer considered to be a problem.

However, it is still worth checking the back focus adjustment if the temperature or humidity changes significantly and a daily check is always advised.