

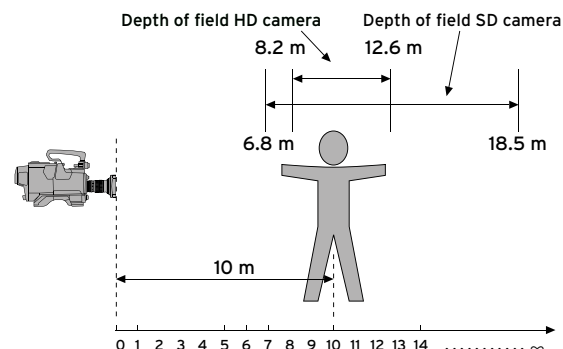
Focusing one step ahead

With HDTV shooting even experienced cameramen often have difficulty in finding optimum focus and in maintaining the sharpest focus on moving objects.

The higher the resolution of the camera CCD the smaller the individual pixels are, and therefore the acceptable circle of confusion also becomes smaller. Thus the depth of field is much smaller in HD than when using SD cameras.

This aspect becomes even more critical when long telephoto lenses are being used.

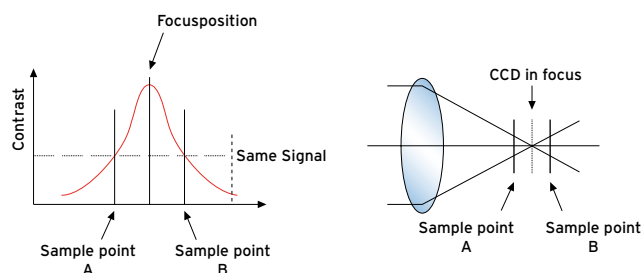
For conventional SD production the resolution of the viewfinder is usually sufficient but in HD production it is often not possible to determine optimum focus, especially in adverse lighting conditions.



The idea of the new precision focus system

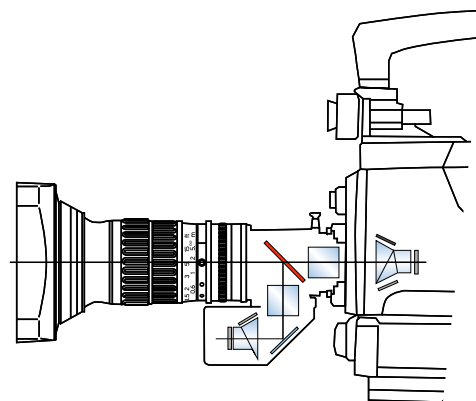
FUJINON, in close cooperation with NHK (Japan Broadcast Corporation), has developed a new system, which was introduced under the name of Precision Focus System.

The development was based on the following idea: when the distance to an object is correctly focused, the image contrast on a CCD sensor will be very high. At the same time, if the contrast is also sampled in front of and behind the CCD along the optical axis (see drawing: sample points A and B) it would be at a lower level than on the CCD but of the same value at each sample point. If the focus were incorrectly adjusted then the contrast measured at the sample points would not be equal. Thus it is possible not only to find the sharpest focus position but also the direction of any necessary adjustment required when focus is not sharp.



FUJINON designed and built the solution – mounting a partly transparent mirror inside the lens, which directs a small percentage of the image to the precision focus system. This is a prism, which splits the light to reach two additional CCDs. The CCDs are then used for contrast measurement. In the PF system (please see diagram), the optical path from the mirror to CCD A is shorter and the distance to CCD B longer than the path from the mirror to the camera CCDs.

If the subject is too far away, the value from CCD "A" is higher than from CCD "B". If the subject is too close then the opposite is true. It is precisely focused when both signals are equal.



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Main features of the Precision Focus System

With the Fujinon Precision Focus System the focus is always controlled by the cameraman. By the use of a sliding clutch, the focus can be adjusted manually at all times. In critical situations the Precision Focus System can be switched on or off by a small switch. Similar to conventional auto focus systems a continuous mode is also available. Since the subject is sometimes outside the image centre, the size, shape and position of the AF sensing area can be adjusted freely.

One of the main uses for PF is in sport transmission situations, where maintaining sharpest focus is more difficult (telephoto shooting). In use with Steady Cams or similar equipment the system can be used in continuous mode.



To summarise, the main Precision Focus Systems features are:

- Focusing is precise and rapid.
- No parallax between image centre and the measured centre.
- The sampled focus area is shown in the viewfinder.
- Indication of focus position and sharpest focus can also be displayed.
- Focus is maintained during zooming and even at a wide angle.
- The cameraman can concentrate on capturing the perfect image.
- Images shot will have maximum sharpness and brilliance.

With Fujinon's Precision Focus System the finest quality in HD production can be assured.

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