

## A perfect team

The introduction of the first HDV cameras in Europe is raising expectations amongst the MINI35 users. The subsequent test shall identify to what degree these expectations are justified and where the limits will be.

### First of all

The discussion is about

- ⊗ Firstly, a video camera for amateur applications. Not less but also not more. The costs: about 3.500 €;
- ⊗ Secondly, the combination and interaction with the MINI35 Digital Image Converter from P+S Technik in Munich.

The motivation to use a HDV camera like SONY FX1 is about as old as the first steps in the field of MINI35 itself. The appearance of the film on a monitor is immediately raising the expectations of its evaluation on the screen. But while doing so one loses very quickly sight of the technology and its limits. Especially on the point that the 1/3" CCD chip is still the bottleneck for any camera shot. The quality of Blow-up copies from a SD production not really have been eye candy until today. Especially when looking at long and medium shots. In the field of HD the situation is completely different.

Especially the impecunious within the creative community were detained by costs and unhandiness of this technology as well as the enormous accumulation of expensive post



production costs in the HD workflow. It again looks pretty much like a vivid activity of shirt-sleeved video freaks and one of the many attempts to achieve true film look without using film material.

But if one takes the film picture really serious, it appears that any approach starting with an independent format (DV, DigiBeta,

IMX, HD etc.) finally returns to the aesthetic foundation pillars of the most commonly used recording format, the 35 mm film. Solely from this aspect the SONY HDR-FX1 and its interaction with the MINI35 Image Converter was of interest for us.

On the cost side the combination of a HDV camera with the P+S Technik Image Converter can easily hide behind the costs of a compact car. It sounds like a fairy tale that screen-ready film material can be created with it. So we went on search for the catch in it.

### **About the project**

For a practical test we used a 45 minute feature film making in co-operation with the University of Applied Sciences Madgeburg-Stendal, department Journalism/Media Management, and the Theatre of the Altmark in Stendal. The budget amounted to about 3.000,00 Euro. The shooting took 10 days. It was directed by Stefan Trampe with actors from the above mentioned theatre. The rest of the film crew consisted of ambitious students from the university with little or even no film experience.

The camera for the project was a Sony HDR-FX1 combined with the MINI35-Image Converter from P+S Technik in Munich. On short notice the company provided a modified Connection Kit as prototype for initial tests and the shooting. As camera lenses a Zeiss HighSpeed set as well as an Angenieux 25-25/3.6 were used.

### **The testing phase 1>**

Within the first step the sharpness was tested. A comparison was made with the most favoured cameras in the DV range, i.e. the XL2 from Canon and the DVX from Panasonic.

The result: the products are not really comparable. The DV cameras support the standard resolution while HDV provides HD resolution. A comparison is only reasonable within the search for arguments to remain in the DV format. Such arguments are obtainable as long as HD does not yet become widely accepted by the users. Anybody, who wants to bring his material onto the screen, can not get around at least an inexpensive step into HDV.

Only two reference picture comparisons shall demonstrate the difference between HDV and DV.

Reference 1 shows the number of pixels per unit of area for both formats:



PHOTO: TILL BECKMANN

Reference 2 demonstrates the resolution within an identical area for both formats:



PHOTO: TILL BECKMANN

This comparison was of significance and importance for us, while it was notified in a test report of a professional magazine, that the FX1 camera shows impressive sharpness, but gives up the HD resolution under low light conditions. And even only reaches DV camcorder resolution. This is true to some degree. The camera behaves similar to the human eye and provides high resolution rendering only over bright sections of the image. If there are no bright sections, resolution is reduced. This leads to an important difference versus typical shootings with DV camcorders. Typically the complexion of a portrayed person is slightly underexposed to achieve an aesthetically suiting image. Even minor overexposure already leads to skin tones with colour breaks and mismatching colour artefacts. In the picture below this is demonstrated with the yellow edges at the right of the white overexposed areas.

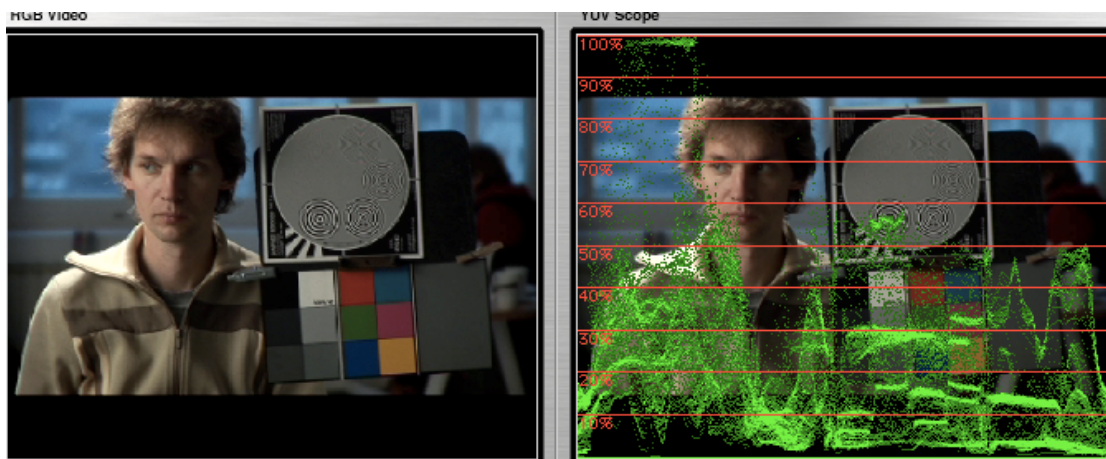


The FX1 camera behaves more moderate in overexposure situations.

Any assumption that digital shots do not require any additional scene light cannot be confirmed. Quite the contrary is true. Whoever wants to refine the pictures with additional scene light will have much fun – much more than with any other camera not using the P+S TECHNIK Image Converter.



HDR-FX1 used without MINI35 Digital Image Converter. The person is in the same range of focus like the background, but the blue background with its higher density of details appears much sharper against the reddish skin. Over and above that the person is illuminated by halogen light with noticeable red content and the kin tone adds to that by itself. The picture appears incorrect even though focus is correctly set.



HDR-FX1 used in combination with the MINI35 Digital Image Converter.

Thus the camera optics allows a more pleasant handling of the light. Not in any case the lamp must be softened or bounced. Time consuming and exhaustive procedures or the space consuming blocking of the set against stray light are significantly reduced. Das vermeidet Vorgänge, die zumeist das mühsame, zeitaufwendige, und den Drehort verstellende Reduzieren vagabundierenden Lichts zur Folge haben. The camera shows significantly less edge steepening which is so typical for SD cameras. With reasonable care the picture appears much less technical.

Outsiders might presume a real movie picture behind this charming bluff package. The oscillating diffusion screen is rather important in this context. It “replaces” to some extent the typical grain of the vagrant film emulsion. The technical appearance of the sharp HD image originates to some extent from the rigid structure of the camera chip. A still picture appears somewhat glazing. Commonly there are used ambitious pan shots or handy cameras to hide this effect. Some call the result authentic; others get sick in the movie theatre.

During our tests verification on the computer also showed that the FX1 at shutter speed 1/25 provides images which are equivalent to progressive full frame pictures. Sony did not comment to that in more detail.

It is important to remark that the configuration of the Sony HDV camera with the P+S TECHNIK Image Converter and the Zeiss HighSpeed lenses enable the user to create film-like images during the shot. So the most important part is already done and the scale of cost and time consuming processes during post production is considerably reduced.

Just one example: for 90 minutes of de-interlacing of a DigiBeta shot a typical service charge of about 5.000,00 Euros is billed. And if this is not included in the budget or if the producer does not care about such „details“ you simply watch a video. This can be a bitter experience; even for the involved actors.

## **Testing Phase >2**

The second phase concentrated on the search for weaknesses in the recording format.

The camera records a picture a pixel count quadrupling the DV resolution, quite a significant data rate. DV tape is used as a storage medium and also the length of 60 minutes remains the same. Finally concentrating on the compression the manufacturer transforms the data into a MPEG2-Stream before storage. The process is identical to classical DVDs. Images are not stored frame by frame but as Intraframes or group of pictures (GoP's), i.e. only the A-frame and the variances from there are stored. If the variances over time remain marginal, the images remain good looking. If not, the concept fails. While we used the P+S TECHNIK Image Converter quite from the scratch and did not use coarse camera movements, we never made any bad experience. Sample pictures of taking a green bush with pure FX1 were full of artefacts. It is assumed that there were too many details in the greenish zone. One might conclude from this already that the Sony and P+S Technik products unintentionally work hand in

hand. The decrease in depth of focus results in reduction of processable data. Sharpness remains only where it is important.

This becomes so much the case that accurateness must be applied very similar to a 35mm shooting. The setting distance must be correct; the camera focus must be continuously controlled and moved professionally. While during shooting on DV material everything was equivalently softened the depth of sharpness was tightened by higher resolution of the HDV camera. This is technically challenging and aesthetically definitely a gain. During our evaluation we used an aperture of 1.4 almost without exception. It is in the nature of such a project, that occasional errors appear, but it also made things attractive. An HD monitor would be strongly recommended to supervise sharpness during the shots. During this project we did not have access to such a monitor and had to use the option provided by the camera:

- ☒ The PEAKING function (on the rear of the camera) which brought the contours in the viewer into sharper focus.
- ☒ The EXPANDED FOCUS function (close to the Zoom gear) which allowed a more precise assessment of the focus during Zooming into the scene.
- ☒ Six different PICTURE PROFILE modes can be set and stored to your own preference. We used one of them to set focus to the maximum and, to be on the safe side, colour to the minimum. This mode then was used during preparation of focus sequences. This allowed us to judge on focus on the different markings. During the shots we then had to rely on the PEAKING function.

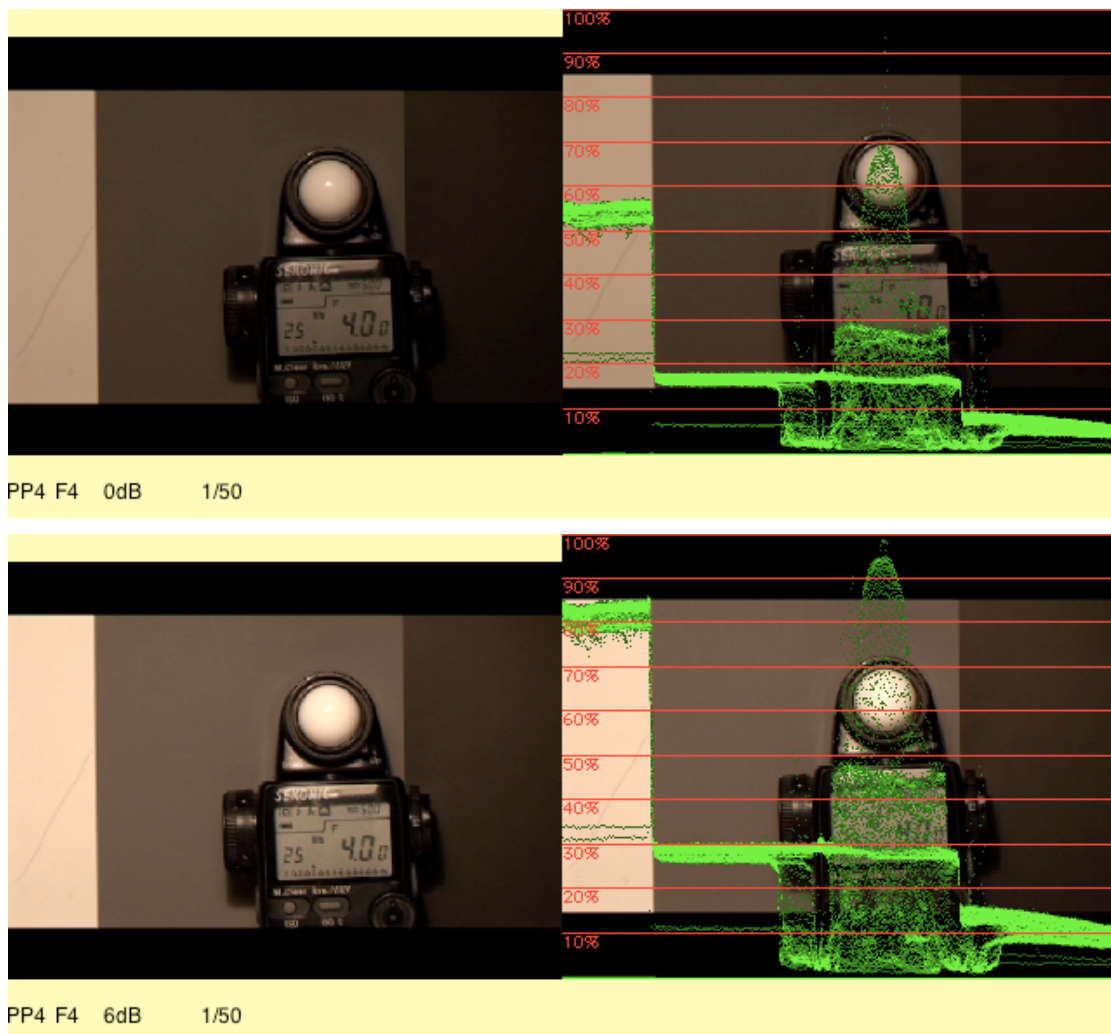


About post production not much can be said yet. Like in the past you react with Offline cuts. Cutting on DV would be the equivalent. As much as the software developers hurry to offer appropriate software to the users, it might be only snapshots in the beginning. You should wait patiently for advanced solutions. But for evaluation of the material itself, some tools are already available. We used iMovie-HD from Apple. But the final quest is the appearance on the screen. Initial exposure test will be available shortly and will allow a first conclusion.

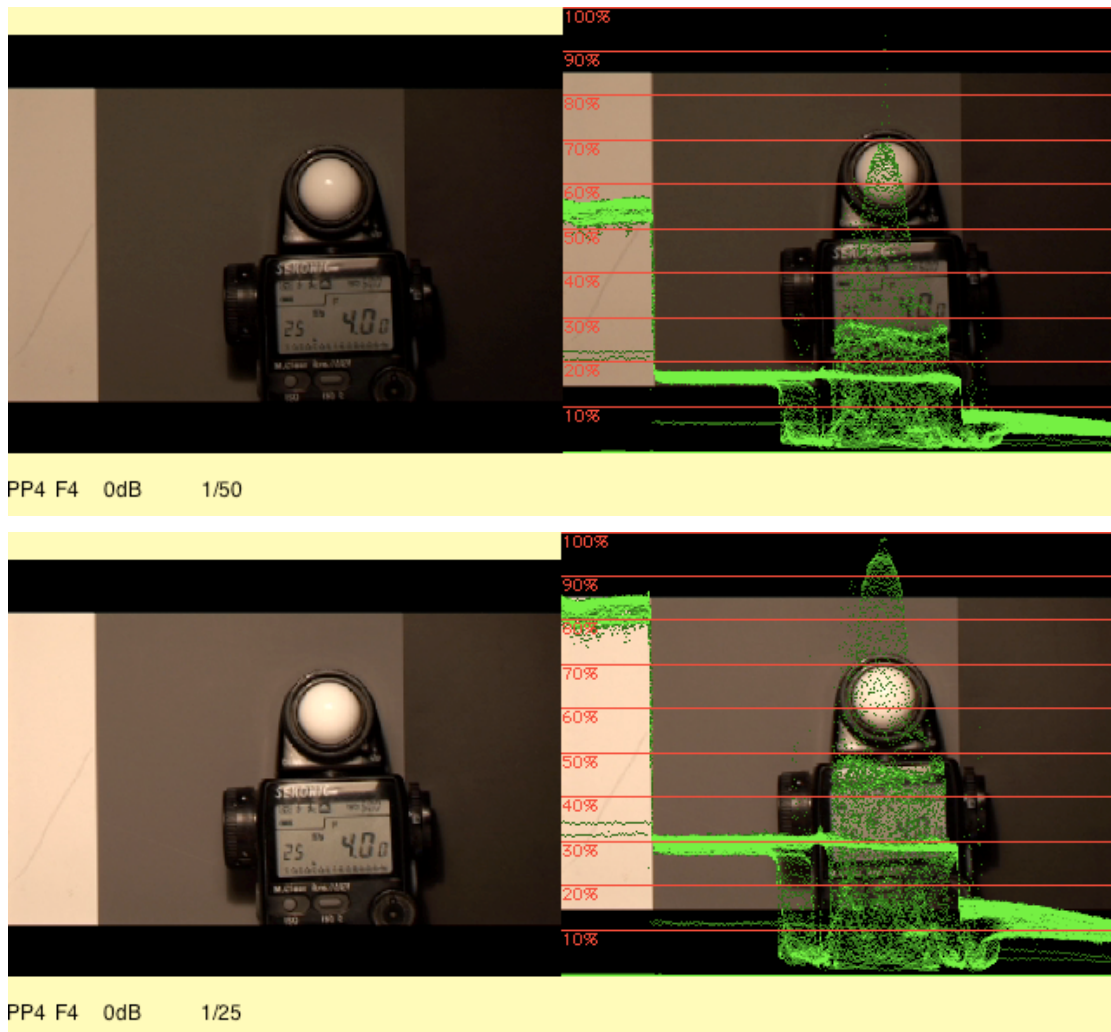
## As a summary some bullet points

### The HDR-FX1E camera itself

Focus	Is astonishing, no steps and no flicker at good light conditions, like one experiences from good DV cameras in 25p mode.
Depth of Focus	is equivalent to DV. Again it is 3x1/3" chips, but 16:9 aspect ratio. Whoever finally wants to have or sell 4:3 format, needs to cut and reconvert the image during post production
Colour Rendering	corresponds with DV, 8bit, 4:2:0
Sensitivity	is low, small pixels only pass little light. Here is of help
Gain	up to 9dB noise is amazingly low but depending on white balancing. The more bluish the more noise is observed.



Exposure Time      1/50i for anybody preferring video-like focus of movement.  
 1/25 adequate for a full frame picture, re-obtaining the aperture that is taken by the MINI35 Image Converter.



Aperture Stop      infinitely variable and self-adjusting for pan-shots into bright corners, very useful.

Zeiss Optics      can be switched to manual but shows typical weaknesses of a Zoom lens, i.e. wrong colours, limited performance and with that one of the weak points of the HDR-FX1.

Output Channels      - RGB component, per Sony the best signal output, but analog  
 - Firewire, corresponds to format from tape, digital  
 - S-Video + Fbas: for monitor on-scene...

Storage Format	HDV, a new standard supported by all leading DV camera manufacturers.
Storage Media	on DV tape (60 min.) as MPEG 2-Stream, Intraframes, GoP.
Rendering	- In HDV resolution, via RGB component on HD monitors. - In SD resolution during production, sampling and pre-cutting on commonly used equipment.
Cutting	In HDV resolution a powerful computer is required. Software development is in early stages only and progresses step by step. In SD resolution as commonly done, HDV material can easily be output in DV format. This allows cutting on SD basis and finishing on HDV basis.
Time Code	FX1 no, Z1 yes

### **The camera in combination with the P+S-Technik MINI35 Image Converter**

Focus	the minor loss is about equivalent to the loss from a filter BPM 1/2 or similar on the regular camera lens.
Depth of Focus	is slightly reduced due to higher resolution compared to DV cameras.
Sensitivity	one aperture stop is taken by the MINI35 Image Converter itself, during zooming into the image frame of the Image Converter the camera aperture of the FX1 shuts down from 1.7 to 2.8 (= 1 1/2 stops. This can be balanced back by switching to Gain 6dB, resulting in one stop gain.
Exposure Time	requires to be 1/25 or film-like appearance, returning the aperture stop that was taken by the Image Converter.
Aperture stop of the lens	can be stopped down to 5.6 due to the oscillating diffuser.
Camera Lens	must be selected more carefully, because already minor differences in sharpness already will improve resolution significantly. Camera lenses from Nikon work softer than rental Primes.
Image Converter	provides a LANC connection via accessory cable to the camera. The Image Converter is only online when the camera is recording images. This eases up and saves battery power. Recommendation: in cold environment keep the Image Converter in continuous operation with an extra battery pack and heat the device (heatable Barney's and view finders are no an invention of the MINI35 Digital technology).

## **Conclusion 1**

Test it by any chance.

Well knowing about the specific details of the technology one will use it exactly equivalent to any other film camera. Each technology has its particularities and technical limitations that must be encountered. And especially one question must be answered by everybody individually: Is a technology that is 20 times more expensive than HDV also 20 times as good?

At least one assumption is confirmed by this development, everything reiterates. Already Leacock, Pennebacker et al. have developed and introduced an adequate and cost effective alternative to existing technologies. Today the achievements with this new degree of freedom are seen as important milestones in the history of documentaries.

Today we are again at a point where an affordable technology enters the arena to challenge the established film technology. Especially the success of ambitious independent films seems to establish a standard for copying video productions to film material.

## **Conclusion 2**

refers to the catch in it. The price-performance ratio during production is really impressive. But the video production typically reveals the expensive surprises only during post production. A powerful computer (Apple G5 2x2 GHz or more and at least 1GB RAM) with a decent HD display is required together with an adequate HD 23" monitor screen and a perfect cutting software (appropriate products will enter the market in course of the year) to finish HDV material in native resolution. HD compatible evaluation hardware like a beamer or HD capable finishers might be also useful. Everybody must scale to his own measures.

It is of course admirable that this technical development continues to require professionalism and none of the aesthetically demands in the field of film must be abandoned.

Uwe Mann                    - Camera

Till Beckmann            - Post production, finishing preparation