Does a good digital camera replace an SLR?

Today's digital cameras produce very good photos which can be printed in photo quality. However, even the best digital cameras do by far not offer the same photo information as provided by a good SLR. A reasonable example: A customary 5 megapixel digital camera produces 5 million pixels – the maximum amount of information which can be viewed on a monitor or printed on paper. A good photo, in contrast, provides 10-20 million pixels.

High-quality digital cameras may reach SLRs as far as image quality is concerned. However, they still provide distinctly less information than contained in a negative or a slide. The difference is not noticed when viewing the photos on a monitor or printing them in a format of 10x15 cm. If a detail of the photo, however, is zoomed or the photo is printed in DIN A4 format, the higher pixel density of negatives or slides becomes obvious.

Since the up-to-date film scanners with a 4000 dpi resolution scan up to 21 million pixels from a slide or negative, there is no better combination at present than an SLR in combination with a film scanner to generate the most perfect digital photos.

Are positives (slides) or negatives better suited for scanning?

At first, it seems obvious that the scanning of positives, be it a framed slide or a film strip, is easier than digitalising negatives. After all, a positive is a real photo which can be compared directly to a scan displayed on a monitor. The mere scan preview will indicate whether the exposure of the scanner is adequate and whether the autofocus of the slide scanner has found the correct focus. With negatives, however, the film strip shows inverse photos which, in addition, have an orange coloured mask. A high degree of imagination is required to conclude the correct picture from the negative. The scanner software has to correct the orange coloured mask. It is even more difficult to determine on a negative whether the photo was exposed correctly and whether it is sharp or not. The big advantage of directly comparing a scan or a preview in the scanner software to the original does not exist with negatives.

There are even more advantages for slides: Slide films have a finer grain, have a larger contrast range, provide more intense colours and offer a higher resolution. Besides, slide films have a higher density range: The maximum density of a slide film can be up to dmax = 4 to allow for finest shades of the individual colours.

The high density range of a slide film, however, also holds disadvantages: Many bottom of the line film scanners do not have such a high density range to be able to differentiate individual shades of slides when approaching the maximum density. By nature, negatives have a smaller density range so that even inexpensive scanners can handle negatives well. Photographers know that it is more difficult to take a slide than a negative since slides take amiss the tiniest error in exposure while negatives are much more tolerant due to their lower contrast and dynamic range. The same applies to scanning: Correctly exposed positives can be scanned very easily. For slightly under- or over-exposed slides, however, corrections in the scan programme or in the subsequent image editing will be required.

Does a film scanner convert negatives to positives automatically?

The scan process for scanning positives (slides) is as follows: A lamp screens the film and a sensor measures the transmitted light. The brightness of the individual shades is used to compose the finished photo. But what about negatives? Do you get a "negative" image when scanning a "negative" photo which then must be inverted and edited with an image editing programme to eventually obtain a normal positive? Or does the scanner perform this time-consuming job automatically?

To start with: A negative is not simply converted to a positive by inverting the colours, i.e. converting black to white, etc. Colour inversion indeed is required to obtain a normal photo from a negative. In addition, the orange coloured mask must be subtracted or extrapolated. Since carrier material and film emulsion vary from manufacturer to manufacturer and partly from film type to film type, different computation procedures are necessary for a best conversion of a negative to a positive.

With modern film scanners, users do not have to care about this negative/ positive conversion: The scanner or the scan software will realize this automatically. The basic settings of each scan software require to set the type of film being scanned: positive, negative or negative black and white. If the type is set to negative, a scan will automatically produce a positive image on the monitor or in the output file. Due to the more complex scan process and the necessary inversion and film carrier correction, the scanning of a negative takes up to three times longer than scanning a positive.

Why does the scanning of negatives take so much longer than scanning slides?

When studying data sheets and test reports about film scanners, you will realize that the time to scan a negative is distinctly longer than to scan a positive. Users who digitise both negatives and positives will confirm that the time difference between the two methods amounts to a factor of 2 to 4. Why does the scanning of negatives take so much longer than scanning positives?

With positive scans, the photo is simply screened and the transmitted light is converted directly to pixels. For negative scans, the necessary colour inversion and the extrapolating of the yellow-orange coloured mask from the measured image signal is performed in addition. Thus, a negative scan requires more steps than a positive scan to create a finished image.

If you once scanned a negative as normal positive unintentionally or on purpose, you may have realized a distinctly longer scan time than would have been the case for a normal slide. What is the reason for the longer duration although a normal positive scan was performed? The reason is brightness. A correctly exposed negative is significantly darker than a correctly exposed positive. Film scanners require more time for dark images than for bright ones. If you have ever compared the scan time for a photo taken at night (slide) to a beach motive (slide), you will confirm the considerable time difference.

My slide scans are much too dark. Why is this so?

A well-known phenomenon with slide scanners is that the scans appear darker than the original on the light box or on the screen. Are the scans actually darker and what can I do?

As a first observation, slide films differ from negative films in a negative way in as far as that positive photos must be exposed exactly and correctly. Negative films are more likely to compensate for slight exposure errors than positive films. Frequently, a whole series of slides is slightly underexposed which, however, will not be noticed when projected to a big screen with a powerful lamp in a darkened room. The result is that many photographers think their slides are exposed correctly and adequately bright when they actually are a bit too dark.

It may nevertheless happen that even correctly exposed slides appear darker on a monitor than on a fabric screen. In the majority of cases, this is due to a faulty monitor calibration, or no calibration at all. We recommend all users who scan and edit photos to calibrate their CRT or TFT flat monitors to a worldwide standard using a calibration kit. This is the only way to ensure that the monitor will display the scan or a digital photo in its true colours.

Only when the step of a hardware based monitor calibration has been performed and the scans still are too dark on the monitor, is it worthwhile to adjust the brightness or gradation of the scan software or image editing programme.

How many pixels does a small picture film contain?

Times ago, hardly anybody thought about the resolution of a small picture film. Today, however, ever more proud owners of 5-10 megapixel digital cameras ask themselves how many pixels an "old" analogue film might contain. This question can be answered easily when knowing that a small picture films has an approximate surface of 24 x 36 mm and a resolution of about 100-130 line pairs per millimetre. A line pair can be imagined as a black line next to a white one, i.e. two lines of different colours. 100-130 line pairs per millimetre thus correspond to 200-260 points per millimetre.

Thus, the number of pixels on a small picture film with 100 line pairs per millimetre is calculated as follows: (36 x 100 x 2) x (24 x 100 x 2) = 7,200 x 4,800 = 34,560,000 pixels. Thus, a normal small picture film with a resolution of 100 line pairs per millimetre contains almost 35 megapixels per photo. A resolution of 130 line pairs per millimetre even results in 58 megapixels.

A film scanner with an optical resolution of 4000 dpi retrieves about 20 megapixels from a small picture photo.

What is the difference between TIF, JPG and PSD files?

When scanning a picture with Adobe Photoshop and storing it, a PSD file of a huge size will be generated. If the same picture is stored as TIF file, the size will hardly change whereas the size is reduced drastically when storing the picture as JPG file. What is the difference between the three formats?

A TIF file contains the pure image data in an uncompressed form, i.e. all the information which the scanner retrieves and provides from the scanned photo. TIF files are very large and impractical to handle. When a TIF image is converted to a JPG image, the file size will be reduced by a factor of up to 10 without noticably losing quality.

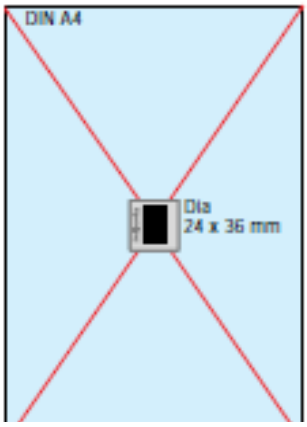
A PSD file is an own file format of Adobe Photoshop. It contains all the information of a TIF file, i.e. all the original photo information, as well as other Photoshop internal infor-ma-tion like e.g. the zoom factor which was active in Photoshop when using the image file the last time. In Photoshop, a text tool can be used to add e.g. a label to an image. If the modified image is stored as PSD file, the label can be edited or moved later. If the modified image, however, is stored as TIF file, the text is transferred into the image and cannot be edited any more.

Can you print a scanned slide on DIN A4 format?

Time and again, photographers are fascinated when a tiny slide is turned into a sharp image of several square feet on a projection screen. Of course, the viewers are at distance of several feet to the screen and will not detect the tiniest details. The question arises how sharp and good an image printed to DIN A4 will be. After all, such an image will be viewed at shortest distance.

For decades, a print with 300 dpi has been considered a pin sharp photo. When the first laser printers with 300 dpi entered the market by the end of the 80s, millions of people dreamt of pin sharp prints with laser printers. Even today, a print with 300 dpi is considered to be absolutely adequate for a high quality print.

As a consequence, the question is whether the resolution for scanning a 24 x 36 mm negative or slide is high enough to reach 300 dpi for printing.
If a 24 x 36 mm slide is scanned with 2700 dpi, the resulting image has about 3,900 x 2,600 pixels. The pixels are distributed on a DIN A4 sheet.



As you will know, the size of a DIN A4 sheet is 29.7 x 21.0 cm. Ignoring a surrounding frame of 0.7 cm (usual print frame), the effective print size is 28.3 x 19.6 cm. If these dimensions are divided by 2.5 (an inch is about 2.5 cm), the resulting print format is 11.3 x 7.8 inch. The almost 3,800 x 2,600 pixels are distributed on this area. A corresponding division will result in a print resolution of about 330 dpi. Thus, the desired resolution of 300 dpi is exceeded by about 10%.

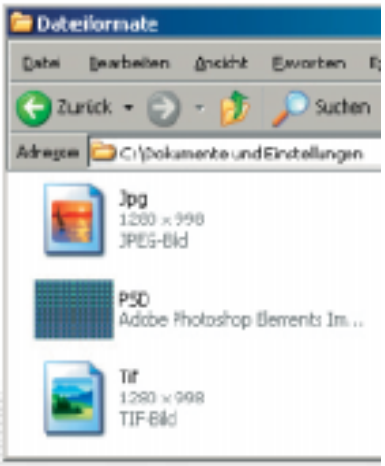
Why does the scan programme allow for a colour depth of 8 or 16 bit, although some scanners have 48 bit?

Some reflecta film scanners have a colour depth of 48 bit, but the scan software allows for a setting of 8 bit or 16 bit only in the respective list field for the colour depth. It means that 8 or 16 bit are available for each colour channel (red, green, blue), i.e. a total of 24 or 48 bit.

How does the ICE/MagicTouch method work?

How can a scanner recognise whether a black dot in a blue sky is a dust grain which should be removed or a bird crossing the horizon? With the image alone, the difference cannot be determined, but by using the film material.

The ICE/MagicTouch dust and scratch removal is no software function as many users think. An ICE/MagicTouch scanner rather distinguishes itself from a film scanner without ICE/MagicTouch by a modification of the hardware. With an ICE/MagicTouch scan, a fourth source of light is used



working on an infrared basis. An infrared beam scans the surface of the film. Usually, negatives or positives have a smooth surface. The infrared beam will detect valleys (scratches, grooves) and mountains (dust grains, fingerprints, etc.) on the surface. When such a valley or mountain is detected, the corresponding software corrects the respective spot with the information of the pixels found in the vicinity of the faulty spot.

Does the scratch removal method also work with black and white films?

The automatic dust and scratch removal system works with colour slides and negatives exclusively. When scanning black/white photos, the removal system must be switched off.

If you nevertheless leave the scratch removal system active when scanning a black/white film, a milky photo will be the result where the rough outlines only of the displayed motives are visible.

Does the scratch removal method also work with Kodachrome films?

The ICE/MagicTouch dust and scratch removal system works with Kodachromes in a way that dust and scratches are corrected effectively. A negative effect, however, is that also parts of the photo where there is no dust will be blurred. Therefore, the system should be deactivated for Kodachromes. The reason for the problems of the ICE/MagicTouch method with Kodachromes is the silver content of the films. In principle, Kodachromes are black/ white films which are coloured only afterwards.

What is the advantage of a film scanner compared to a flatbed scanner with illumination source?

The main difference between flatbed scanners with illumination source and film scanners is that in flatbed scanners, the film is placed on a glass plate from where it is scanned.

In film scanners, the light is transmitted directly through the films. Since glass plates have a negative effect in the imaging performance of optical devices, the mere technical layout of film scanners offer a decisice advantage compared to flatbed scanners. Disturbing effects, like Newton rings or blurring due to bent potos due to the heating of the glass plate do not occur with film scanners at all or only when scanning slides with glass frames.

Another advantage of film scanners is their optical density:
The main task of flatbed scanners is to scan top-view photos, i.e. reflecting photos with a very small density range. To render all details of film material, an optical density up to a value of 3 is required which is reached by very good film scanners only. As a result of an insufficient density range, the shadow areas and areas with bright lights have little contrast.

What resolution is required for a beamer projection?

An average beamer may be able to project as many pixel to a wall as an average TFT monitor can display, namely 1024 x 768 pixel, multiplying to some 800.000 pixel, not even 1 megapixel. Even a small picture slide scanned with 2000 dpi provides as much as 5 megapixel. If the scan resolution is cut half to 1000 dpi, the resulting image still has about 1.2 megapixel, which is absolutely sufficient for a beamer or a normal monitor.

How can I view scanned photos on my TV set?

Now, you have scanned 100 most beautiful photos of your holidays, and you do not want to look at them on the small PC monitor in your office but enjoy them on the large TV screen in your living room.
There are several possibilities to have this pleasure come true:

1. Virtually all standard graphics cards have a TV outlet or even a S-VHS outlet. These interfaces can be used to connect a TV set to a computer. Then, you will see everything you would normally see on the PC monitor on the TV screen, including e.g. a photo presentation.
2. You can burn the scanned photos on a video CD and play it with a DVD player. You will then see your scanned photos as a film on TV. You can also burn individual images to a video CD. Virtually all DVD players of the newer generation will play video CDs; older players, however, do not yet know this format.

What is the advantage of an IT-8 colour calibration?

The IT-8 colour calibration is a colour correction method. There is a standardised template which has a large number of individual colour fields. This standard image is scanned, and the calibrating software measures the scanned colours in the individual colour fields. Afterwards, the software compares the measured colours to an IT-8 reference table where the actual RGB values are specified for each individual colour field. This comparison results in a difference table containing the colour deviations of the scanner. For future scans, the scanned colours will be corrected based on this difference table to obtain scans with true colour values.

The IT-8 colour calibration is contained in the full version of the scan software Silverfast AI which can be obtained from reflecta.

ROC colour restauration

ROC is the abbreviation for Restauration Of Colours. ROC is an effective method to restore the colours of old, faded or yellowed photos.

Such material can be freshened with ROC impressingly. However, ROC is not a method which can be applied to any picture. Photos taken on a beach with blue sea and blue sky, for example, will become extremely distorted with ROC. The ROC colour restauration is a method which is purely software controlled.

GEM graininess reduction

GEM is the abbreviation for Grain Equalisation & Management. The grain equalisation algorithm analyses the scanned photo directly after the scanning for recurring patterns on the film grain level. Based on this analysis, film grain structures are recognized and smoothened. The application of GEM always results in a certain blur. Due to this reason, photos scanned with GEM should be processed with a deblur masking to get edges pin sharp again.