Creating the 'Film' look

Mark Brindle explains how to achieve the filmic look using the Redrock Micro35 (M2) cinema lens adapter

Many of you, like me, will have tried to create a more filmic look to digital video using a range of post production techniques. There are many 'film-look' plugins for NLEs such as Nattress and Magic Bullet which provide some great tools for modifying gamma curves, adding grain and colour tinting, emulating specific types of film, de-interlacing, using 24p pulldown to get closer to film-motion and using colour effects such as bleach bypass.

The latest ranges of DV and HD video cameras have added 24p and 25p, 'cine-look', cine-gamma, and in-camera controls for tweaking gamma curves so that more can be done in production. Using filters such as black diffusion and black pro mist can also help to soften video to give it a more filmic appearance.

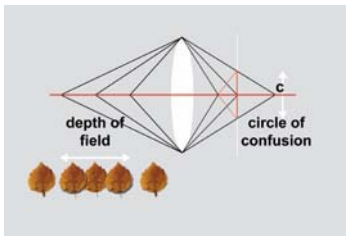
However, after using these techniques, something is still missing…. Depth.

Depth of field and focus can be very effective, creative tools to control what is being seen on screen – by creating a narrow depth of field you can control which parts of an image are in focus and direct the viewer's attention to only those parts of the scene you wish them to look at.

Video cameras generally provide a large depth of field – i.e. a lot of the scene is in focus, whereas film cameras provide a wider control over the depth of field. So why don't video cameras allow a narrow depth of field (DOF)? The limitation is mostly due to the small size of the CCD in most digital video cameras. Even the 2/3" CCDs suffer from lack of DOF.

Depth of Field

The zone of focus is a flat plane (not circular), perpendicular to the direction of the lens. It is a plane of variable width which extends in front of and behind the point of maximum sharpness. This plane of focus is called the depth of field and varies for each camera/lens combination.



The depth of field (DOF) or rather the parts of an image which are acceptably sharp is related to:

- the aperture (f-stop)
- the focal length of the lens (50mm, 85mm etc)
- lens diameter
- the subject distance
- the size of the imaging plane - the CCD in a digital video camera.

As a lens gathers light and projects the image onto a film plane or CCD, the light gathering power is expressed by the f-number (f-stop) and is a ratio of the focal length and the lens diameter (aperture). Think of mechanical apertures on stills cameras – the higher the f-stop number (say f22 or f32), the smaller the hole in the iris and the less light which is projected onto the CCD.

f-stop number = focal length / lens diameter (aperture)

With every other part of the camera/lens system fixed, the depth of field decreases (gets shallower) as the aperture size is increased (the f-stop is decreased). This is illustrated in the three images opposite with a fixed focal length lens (50mm) shown at f2.8 (wide open on this lens), f5.6 and f11.

Circles of Confusion

To try to explain this process we need to look at how the light entering the camera is actually recorded on the film plane or CCD. All light from any single point will generally be recorded as a circle rather than a point – ideally a small circle – the smaller the circle, the sharper the recorded image. When the circle is sufficiently small it is recorded on the CCD as a point and is said to be in critical focus. This circle effect is referred to as the circle of confusion.

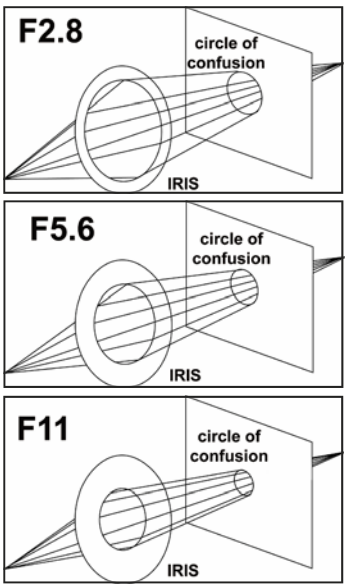
The acceptable sharpness of an image is usually referenced against a fixed size of circle of confusion – i.e. 1/1000 inch or 1/1400 inch diameter. For a given camera/imaging system and lens combination you can calculate the depth of field for a fixed size of circle of confusion. Tables are generally calculated for you and marked in focal distance based on the size of the circle of confusion. Some 35mm lenses (especially older ones) also show depth of field for each aperture setting.

The size of the circle of confusion – the size that a circle becomes a point is related to the size of the imaging plane (CCD) and the recording format – 35mm film, SD or HD video ☞

and the magnification of the final image. It is related to how the eye perceives the image. There is a point at which the eye does not see the circle but sees a sharp point instead. This is partly related to the screen size and viewing distance – think of how a cathode ray tube Television or LCD TV displays an image – its made up of a large number of small dots – you can only see these on very close inspection. As the size of the projected image is increased (say a cinema screen size) the more the eye can discern the detail and the smaller the circle of confusion needs to be to give the same effect of a point source.

So how does the size of the circle of confusion change with aperture? As shown in Fig 2, 3 and 4 below, as the aperture size of the iris increases, the circle of confusion gets bigger and this leads to a narrowing of the zone of acceptably sharp focus leading to a narrow depth of field.

As the aperture is closed down and the f-stop is increased, the amount of light entering the camera is reduced and so for practical purposes this leads to a maximum amount of depth of field (maximum size of zone of sharpness) that can be achieved.



Bokeh

You can't mention depth of field without also mentioning 'Bokeh'. Apparently from the Japanese 'boke' meaning 'blur', the name is given to the characteristics of the out of focus portion of the image. Different lenses produce different kinds of bokeh – some more pleasing than others.

It's essentially showing the circles of confusion and is related to the shape of the aperture of the lens and the subject being filmed – the more rounded the aperture (more blades), the better the bokeh for most types of images.

So to recap – depth of field is controlled by the lens aperture, wider aperture = narrower depth of field. The location of the depth of field is controlled by the lens focus. The larger the film plane/ CCD, the narrower the depth of field will be.

For practical purposes video cameras can provide a shallower depth of field with the use of ND filters either in the camera or on a Matte box so that you can keep the video lens aperture wide open. Using telephoto lenses (high focal length) and zooming in all the way to the telephoto end can also help to narrow the focal plane due to the magnification factor (higher magnification equals larger circles of confusion).

However, you do need to be a fair distance away from your subject with this technique and you still do not get as narrow a DOF as can be achieved with a film camera due to the CCD size.

Image Projection Solutions

So how else can you create a shallow depth of field? If you increase the size of the imaging plane you will narrow your depth of field. Many solutions have become available that use this principle by projecting an image onto a translucent surface at a size comparable to a 35mm film image. The video camera then focus's on this larger projected image. Similar to methods used for transferring cine film to the digital realm.

Designs for 35mm projection adapters are based around a number of elements:

- a translucent surface on which the image is projected.
- a macro lens to help the video camera focus close enough onto the projected image.
- a front lens to enable focus and iris control of the projected image.

Grainy Issues

Grain can be an issue with a fixed projection surface, so some 35mm adapters use a spinning or vibrating disc so that any surface defects or features are minimised. Chromatic aberration can be an issue so the macro lens must be very high quality. Light loss is also an issue as you are adding an extra couple of chunks of glass onto the front of your camera, so lighting is crucial in making these systems work correctly. ☞

Depending on your video camera type, you may also need a relay lens to allow it to connect to a 35mm adapter. However most, if not all, fixed-lens video cameras do not need a relay lens. Image-flip is also an issue – the resulting image projection is flipped and rotated so that you either use a prism system or rotate the recorded image in post production.

There are details on the web for making your own 35mm adapter or you can buy one ready made from the likes of P+S Technik, Redrock Microsystems, Cinemek, SGpro, indie35 and others. If you have the money the new MovieTube may be your preferred option for cine-like depth of field control.

Redrock Micro35 (M2) cinema lens adapter

Now that the theory is out of the way and you are no longer in a state of confusion about depth of field, lets focus on the Redrock Micro35 (M2) cinema lens adapter and how this works in a practice.

The Redrock M2 is an 'affordable' system comprising a spinning ground glass element housed in a sturdy aluminium box with a variety of lens mounts (Nikon F-mount, Canon EOS, Canon FD, Olympus, Pentax K, Pentax K and PL mount for cinema lenses). You buy a 'bundle' based around the lens mount of choice. The Nikon F mount seems to be the favourite choice since Nikon have not changed their lens mount for decades and so an old AI manual focus Nikon lens is just as easy to mount and use as a new AF zoom lens. Manual focus lenses tend to have better focusing ability and are generally cheaper than AF lenses. AF lenses can be used but you will be manually focusing with them using the M2. There are many good manual focus lenses floating about out there – maybe time to dig out your old still cameras? The bundle also comes with a 15mm rod mount system to attach your video camera to the M2 unit plus a 10x achromatic (macro) lens to provide the ability to focus your video camera onto the projected image. There is an SD bundle and an HD bundle – the difference is in the achromatic lens supplied – either 55m for SD or 72mm for the HD version. Various aluminium shim kits and step down rings are available – depending on your video camera you will need to use different step down and spacer rings to set the correct distance between camera lens and adapter. The shim kits allow the camera to be set at the correct height for the adapter – this is more a limitation of the rod mount system though.

The system in this article shows a Panasonic HVX200 mounted on a Vocas rod support with 24" aluminium bars (from Geardear) with Redrock Micro35 with HD Achromatic lens and MicroFF, Nikon 85mm/f2 lens, Vocas Wide Matte Box, Cavision shoulder brace, Teletest LCD screen on Noga arm, Geardear handles, DVTEC Eng-rig adapter, Sennheiser wireless Mic receiver, Redrock base plate used as a counterweight with extra DVD battery (silver) to power the M2. All sitting on a very unhappy Manfrotto 503 head (due for replacement with something more heavy duty).

There are many after-market rod mount systems and accessories available from Zacuto, Geardear, Cavision and Vocas amongst others to allow you to connect Matte Boxes, battery plates, shoulder supports, back plates for counter-weights, alternative base plates etc - all using the same standard 15mm rods and rod spacing, so compatibility is not an issue. Redrock are planning a Matte box (Micro Mattebox) in the near future.

Basic Setup is Simple

The basic setup is simple enough – connect the parts together and point the camera at a well lit wall and then focus your camera on the grain of the static ground

glass. Zoom in your camera until the whole projected image is in the screen and you cannot see the sides or the bottom of the ground glass. At this stage you don't need to use your cameras zoom or focus any more and ideally you want to lock these down if possible. Depending on your camera, Gaffer tape may be the only solution.

The standard Redrock solution uses a 55m rubber boot (a rubber lens hood) attached to a skylight filter on the M2 to connect the 55mm achromatic lens with a 55mm-72mm step up ring or directly to the 72mm achromatic lens (I have both lenses as the 72mm was not originally available and was provided at reduced rate as an HD upgrade). This 'soft-mount' method makes it easy to de-couple the camera from the M2 but also gives rise to some camera movement and the possibility of misalignment of the camera-M2 (which can lead to lack of edge-to-edge sharpness).

An alternative method which I use, is to hard mount the achromatic lens to the m2 using a blank circular polarizer filter (which spins freely) which fixes any issues with alignment. Connect your lens of choice (in this case a Nikon 85mm/f2 fixed focal length manual focus lens) and use the focus and aperture on the front lens to achieve the look you want.

In brightly lit and outdoor shooting scenarios you will need to adjust the camera's ND and iris or add ND filters to the front using a Matte box. Don't forget to switch on the M2 and start the ground glass spinning otherwise you will get a lot of grain – especially noticeable when panning (when it's off by accident). The motor has some noise which may be picked up with a camera-mounted microphone but it is pretty minimal and has not caused me any problems so far.

The M2 itself is a robust structure along with stainless steel 15mm rods and aluminium base plate. The only real issue with the M2 (aside from availability) is the location of the 9V battery to power the ground glass motor – you have to remove the unit from the 15mm rods and undo two screws to remove it. There is an external power connection which you can plug in any 9V supply – I found cheap rechargeable Lithium Ion DVD player batteries work well and also help as a counter weight on a plate at the back of the rod support.

I have made it sound fairly trivial to connect up the M2 and get fantastic images – however in reality it is not that easy. With certain video cameras, you will find information on the Redrock forums (in tutorials or from other members) relating to specific setups – these will definitely help you get the shim height correct and the camera –M2 distance correct. However you may still need to adjust the height of the motor inside the M2 (and hence adjust the height of the ground glass – my next job), you may have issues with edge to edge sharpness if the ground glass isn't spinning correctly (perpendicular to the light plane) or your camera/M2 alignment is not correct.

The M2 has been designed to be taken apart – rather than 'voiding the warranty' Redrock actively encourage you to pull it all apart. Its basic construction means you will probably have to do some mechanical tweaking and experimentation to get perfect results. You can get near-perfect results though fairly easily. The more time you spend using the adapter, understanding the theory and experimenting, the better your footage will be.

Flipped!

The projected image from the M2 is flipped and so you either need to adjust your perspective and get used to filming everything upside down – very tricky for framing unless you're a fighter pilot – or use an external monitor mounted upside down or with a flip function. Most digital video camera LCD panels do not have a flip function built in, however ☞

some can be fooled into flipping by placement of a small magnet. More information is available on the Redrock web forums – which are an excellent source of discussion and information relating to tweaking and tuning your M2 unit.

Whichever solution you go with – I use a Teletest 4.5" LCD monitor with flip function and a composite video connector, you will be using the monitor for framing and possibly for focus control too. In a studio environment you might consider using a large tethered HD monitor, or a laptop running various monitoring and capture software. Redrock have shown some intent for building their own inexpensive LCD field monitor and also have a beta version of a PC based application for monitoring (with flip function) and focus assist – not currently available yet though. Marshal HD monitors with composite connections are expensive favourites within the Redrock community.

Fast Lenses

Due to light loss (you will lose about 1 – 1.5 stops through the adapter and lens combination) you do need to use the fastest lenses you can. Fixed focal length lenses are more suited to the adapter than zooms simply due to the fact they are generally faster. You can get 50mm fixed Nikon lenses as fast as f1.2 although f1.4 or f1.8 is more common. The alternative is use lots of lights – indoors you will find you need to use lights more often or more of them then you would otherwise, but the more you 'light like film' the closer you get to a 'film look'. Outdoors is not a problem although I don't have any lenses slower then f2.8

Other issues with zoom lenses can include lens breathing – where the image changes size as the focus changes – not so much a problem when taking the still picture they were designed for. Lens breathing can also be seen in some fixed focal length lenses too – I have one such lens which will be going back onto eBay or reserved for stills photography only.

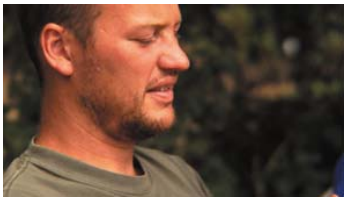
Too Much Depth?

So why not just get extra fast lenses and open them all the way up? You will certainly get a narrow depth of field – but sometimes it will be too narrow to keep someone in focus for the shot you want to achieve. Plus some lenses are actually sharper a few stops down from their maximum. With some lenses and some camera-subject distances you can achieve depth of field of just a few inches or even less i.e. focus on someone's eyes and the nose and ears will be out of focus.

In this sequence the guitar player moved forward by about 8 inches and moved out of the focal plane. It was a short duration movement and doesn't really bother me too much.

In other situations you will need to use film techniques such as blocking and marking your focus positions – not very easy for 'live' action where you will generally just have to constantly adjust your focus or increase your depth of field accordingly, or use a focus puller who's job is to maintain focus through a shot.

Here you can see some grain evident in the middle shot when panning the camera and changing between the two focus marks.



Follow Focus

To help with focus adjustment, Redrock make the Micro Follow Focus (MicroFF) unit which allows you to do repeatable focus using a large white disk which can be marked (with a grease pencil) for each focus position.

The unit is attached to the 15mm rods and uses a toothed gear to turn the focus mechanism of the front mounted lenses. The MicroFF comes with a cine pitch gear which matches with standard cine lenses gears. For other lenses (like Nikon) you will need to use one of the Redrock lens gear adapter rings (supplied with 3) which slip over the focus part of the lens and have a similar toothed gear. These come in a variety of sizes to suit most lenses and a max throw (amount you need to turn the focus on the lens to go from close up to infinity) of 320 degrees which should suit most lenses. You can also get lens gear rings custom machined as after-market accessories (for example if you need greater then a 320 degree throw).

The follow focus is easy to use and allows the use of a speed crank or a focus whip through a standard connection port on the side. Since the throw of a small stills lens isn't too large its less likely you will need a speed crank (basically a handle to turn the focus dial quicker), but a focus whip may be useful to allow a focus puller to operate the focus from further away from the camera (typically only 12 "or 18" – but far enough away to see a bigger focus-assist monitor). You can use small bulldog clips on the while ring for hard stops. Redrock have made noises on the forums about making their own focus whip and also a wireless motor-controlled follow focus although no details are available yet.

I was hoping the MicroFF could be used on the Panasonic HVX200 directly when not using the Micro M2 – but its just a little bit too wide to fit close enough to the HVX200 to operate a focus ring. I am still progressing a possible solution with Redrock on this however. Other Follow focus devices made specifically for digital video cameras (not using a 35mm adapter) do not seem to suffer from this problem – although you still have issues of lack of hard stops on the focus gear itself.

The MicroFF has some minor backlash issues within the gearbox – but focus is repeatable based on the marks you set, but if you force it and drive it too

hard at the end of the lens focus stop you will cause it to spin and lose you marks. I do find it a lot better to use then just manually turning the lens focus ring. If your lens focus ring is too tight you will have some problems using the MicroFF and for very long lenses (say 180mm +) you will need a lens mount to help stop the lens sagging. Geardear make a long lens mount which works well with some long lenses. Redrock have plans for a long lens mount 'soon'.

When do you use it?

I've used the Redrock M2 for documentary and corporate interviews, for music videos and for cut-away shots. I have so far avoided using it for live music and sports events – although that's set to change soon. For shots that can be repeated over and over – like drama or music videos it's a superb way to get the film-look. For sports or live events it's going to be time consuming and may be usable for a second or third camera, but it's not really designed for that purpose.

I love the images the M2 produces and the extra creative freedom it gives me. It makes you want to go and film things – even a basic shot of the flowerbed looks great! Or just using the achromatic (macro) lens and doing extreme close ups of spiders in your bathroom – the M2 opens up a whole world of possibilities. However, if your looking for just a simple point and shoot solution then this is not for you. ■

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MANIAC films ltd

Notes: Micro35 M2 Cinema Lens adapter and accessories - www.redrockmicro.com (M2 HD bundle $1295 plus shipping and import duty. Micro Follow Focus bundle with 3 lens rings $645 plus shipping and import duty.) Find below websites for all other suppliers mentioned in this review:
www.geardear.com
www.teletest.co.uk
www.vocas.com
www.cavision.com
www.batteryexpress.org.uk
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