Macro/close-ups with Panasonic Lumix M4/3 Cameras

The world of macro photography can be very rewarding, if not at times extremely challenging.
We can struggle with problems of camera stability, subject movement, depth of field, lighting and image resolution.
Most of these can be overcome with a little practise and preparation.

If we just want to capture close up pictures then the process is a little less complicated. Using only something like the standard kit lens with a 14-42mm focal length can be used to get close enough to most subjects to enable us to capture subjects which are over a few inches in size. The lens will allow the camera to focus to within 10cms from the lens to the subject when the focal length is set to the widest setting of 14mm (28mm EFL).

The image above was captured with the GX80 with the 14-42mm lens at F8 and a distance of 12 cms

The only problem that you may encounter at these wide angle settings is image distortion when the subject is close to the lens – you may see the front part of the image appears much larger than it is – almost a barrel shape effect. This can be overcome by moving the camera back and selecting a slightly longer focal length setting. Then, by selecting a smaller aperture this compensates the loss of depth of field through using a longer focal length.

If you need to capture larger images from smaller objects then you need to resort to either using supplementary close-up lenses, extension tubes or a dedicated macro lens.

The use of close up lenses, like the set shown opposite, provide a cost effective way to entry into the world of close-up photography.
They do suffer from a few optical problems but for most casual users may be all that is needed to obtain some great close-up images of insects, coins, stamps etc.

To obtain better optical quality we need to use lenses that are designed to reduce these distortions and chromatic aberrations (colour fringes) and these are known as achromatic lenses.
They are many more times the cost of the set of simple element lenses, however, if you really want the best possible images then one of these in your kit bag is recommended.

Achromatic lenses are corrected to bring two wavelengths (typically the red and blue) into focus at the same plane.

The most common type of Achromat is the achromatic doublet, which is composed of two individual lenses made from glasses with different amounts of dispersion.
Typically, one element is a negative (concave) element made out of flint glass, which has relatively high dispersion, and the other is a positive (convex) element made of crown glass, which has lower dispersion.
The lens elements are mounted next to each other, often cemented together, and shaped so that the chromatic aberration of one is counterbalanced by that of the other.

Raynox lenses are currently the Achromat of choice as they are easy to find but other brands have previously made achromatic closeup lenses like Sigma and Canon, and you may be able to find these on eBay.

The Raynox 150 is a good choice to start with a kit 18-135mm lens on APS-C or 14-45mm on M4/3.

It is a +4.8 dioptre lens, focal length about 210 mm. When used in front of a 18-135 lens, it will go up to about 0.65X, giving an image width of around 35mm on APS-C

Should you seek higher magnification, you might go up to the Raynox 250 at +8 diopters, which will get you to a little more than 1:1, about 21 mm field width with the same 18-135mm lens.

Extension tube fit between the lens and the camera body. They carry all the electrical connections to permit autofocus, image stabilisation and aperture control through to the attached lens.
By moving the lens forward allows it to focus closer.
There is a slight loss of light as the imaging circle is spread over a wider areas but optical quality is maintained.

The thing to know about using an extension tube is that it potentially gives you two complications.
The first is infinity focus - lenses that focus at infinity without an extension tube may and probably will lose the ability at infinity with an extension tube mounted. Some lenses focus beyond infinity and can theoretically focus at infinity with a small extension tube mounted.

Do bear in mind that whilst extension tubes are a cost effective way to get into extreme macro, they're not necessarily optically the best.
Although tubes, not having any glass components, don't add any extra aberrations, what they might to is cause the optical aberrations of a non-macro lens to be magnified.
So if you're using a standard lens on the end of extension tubes, this might not be optimised for flatness of field, or even for a close distance, and that would be magnified by the effect of using extension tubes. Here you would see lack of corner sharpness.

For very best optical quality a dedicated macro lens is required. They have specifically designed optics to allow life size images to be captured without additional accessories. Being niche products they are very expensive but for users who capture lots of close-ups it is a very worthwhile camera bag addition.
Lenses of 60mm focal length (120mm EFL) give good working distances to the subject and allow supplementary lighting (flash) to be introduced to provide sufficient illumination for the very small apertures needed.

We are often tempted to use smaller apertures to increase depth of field but we then remind ourselves about the results of “Diffraction”.
Diffraction is an unavoidable physical limitation which limits the resolution of photography, no matter how many megapixels your camera may have.
It happens because light begins to disperse or "diffract" when passing through a small opening (such as your camera's aperture).
This effect is normally negligible, since smaller apertures often improve sharpness by minimising some of the lens aberrations.
However, for apertures used with high macro magnifications, this adds up, and your camera becomes “diffraction limited”.

The reason the effect is so much more severe for anyone shooting macro is because of the difference between aperture on the lens and your effective aperture.

You may think you're using f/8 (not diffraction limited) when in fact you're actually using f/64 (very diffraction limited).
For extreme macro magnifications, a rough estimate is: Effective Aperture = Lens Aperture x (1 + Magnification).
For example, if you are shooting at 4:1 magnification, then the effective aperture for a lens set at f/16 will be somewhere around f/80! Well into the diffraction limited zone.

Here's my YouTube video on macro options
https://www.youtube.com/watch?v=LPQCzoNiOiY

Focus Stacking to Achieve Larger Depth of Field

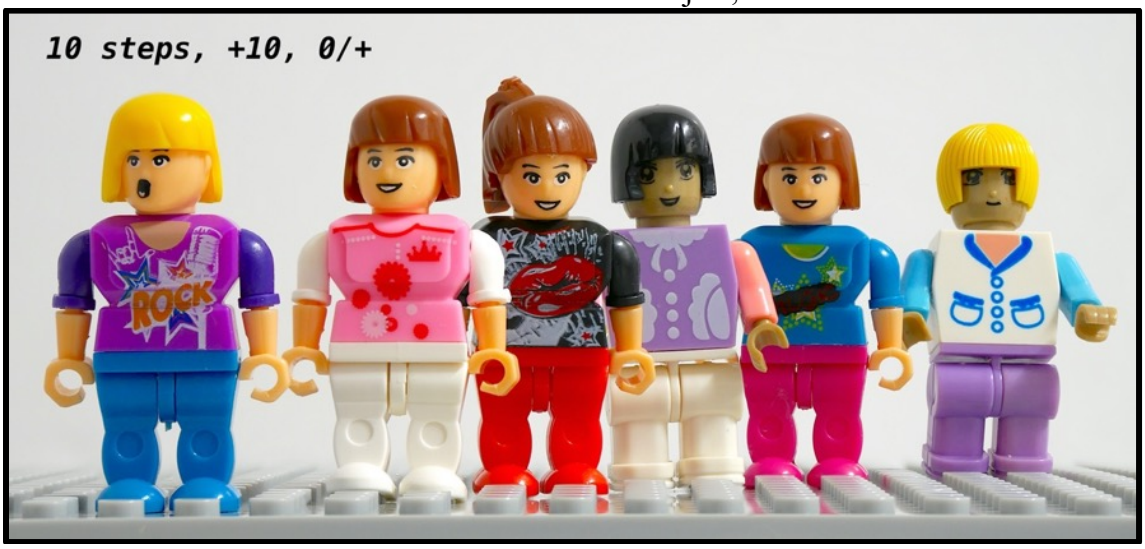
Focus stacking is a photographic technique that digitally combines sharp, in-focus elements from a number of images, to produce one composite image which has a large number of elements in focus that it more than would be possible in a single image, regardless of the depth of field used for that single image.
Focus stacking is a relatively new technique and is possible only because of digital photography.
Focus stacking has various applications. In can be used for landscape images to increase the front to back sharpness in an image.
But it is also one of the main up and coming techniques in macro photography.

Macro photography has one big challenge, that being the very limited depth of field that macro photographers have to contend with.
Even at a relatively generous F-stop, like F22, macro photographers measure their depth of field in millimetres or fractions of a millimetre, and of course that's no good when you're trying to obtain a pin-sharp shot of a subject several millimetres long.

When creating extreme macro images the depth of field becomes extremely shallow.
In order to capture sufficient front to back sharpness it is sometimes necessary to employ some form of focus stacking technique.

There are two types of focus stacking.
One is where the camera moves, normally on a focus slide rail, at various depths through the image.
The second method uses a focus shifting technique.
The choice of method depends upon the amount of overall front to back depth and the field of view of the lens.
Subjects with a large front to back distance can introduce stacking artefacts when the camera is moved. This is shown below.

When the focus shift method is used with the same subject, the results are much better.



Some Panasonic and Olympus cameras have an inbuilt program that allows the second method to be implemented very easily.
You specify the increment between each focus step, the number of total images to be captured and the sequence that will be used.
There is no actual calibration of the focus movement to 1 step of movement so this has to be acquired by some trial and error. It will depend upon the lens and the focal length being used.
For cameras that don't have this there is a smartphone app called Gsimplerelease which allows this focus method to be deployed.

Image captured using 20 steps with increment 5 and stacked in HeliconSoft

Some Panasonic cameras have a post focus program which can build a stacked image

To illustrate just how much depth of field there was to start with, here is the image from the kit lens (14-45mm at 45mm and f6.3)

Here's my YouTube video on Focus Stacking techniques
https://www.youtube.com/watch?v=1cdd-T7fVqM

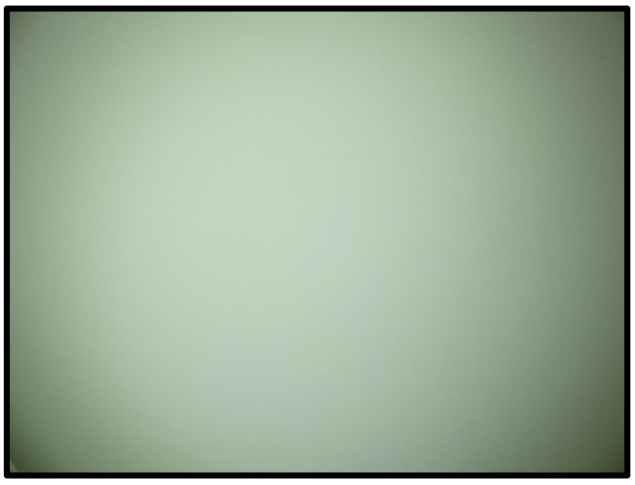
Ring Flash and Ring LED Lights

When looking at additional lighting for macro/close-up work it is tempting to purchase one of the many LED Ring Flashes like the one below.

They are marketed as Ring Flashes, however they are not really flash sources in the true sense. When set to "flash mode" then as the hot shoe contact triggers the ring light the LED

lights are turned on for over ½ second in some units. During this time the shutter is opened. It is the camera shutter speed that is controlling the exposure – not the flash duration.
Some of the units have removeable diffusers like the unit shown below.

Some have opaque diffusers, others have just diffused clear plastic ones.
In one unit that I bought, the white plastic diffuser actually causes backlighting into the camera lens causing horrible ghosting and flair with a noticeable contrast loss. This is because the design of the fitting of the diffuser means that it wraps inside the body of the ring flash. I had to make a cardboard tube to fit inside this diffuse to stop this happening.



You can get a good idea of the light output quality by turning them on in the continuous light mode. All three of my ring lights have very pronounced green colouration and noticeable central hot spot.

All of the lights that I have tested do have the option to set either the left or right banks of lights on but not have individual control of the power of each bank. So you cannot do ratio lighting for example.
If you compare the LED ring flashes to a dedicated Xenon Flash unit there is a lot more control of the lighting available from those devices.

These units usually feature most of the controls that you would find on a dedicated flash for a specific camera. For example you can get Nikon, Canon and Sony variants of these units with or without full TTL control.
Modelling lights help with low level light focusing. Variable power is able to be set for the left and right bank of flash tubes.
Even though you may have a dedicated unit (like mine is for Canon TTL cameras) there's nothing to stop you using these units in manual modes on all cameras featuring a hot shoe.

From the examples above you can see the green output of the LED light ring when the white balance is set to daylight. The right hand image is the WB corrected image.

Compare the LED ring lights to this out of camera unadjusted image from my Xenon Ring Flash unit.

Soft, gentle lighting is a basic feature of LED ring lights. As you may already know, the quality of the light, ranging from a hard point source to a wide diffuse one, can greatly affect the final image.
Since the ring light shines from virtually all directions, the light quality is soft.
It may not be suitable for all subjects, so you should probably just try it out and see what results you achieve with the different subject matter.

One of the things to watch is that the light is on axis with the camera lens and any reflective surface will show bright hot spots in the image.
Textured surfaces can throw up undesirable reflections and this kills contrast and image sharpness.

FZ80/82 Hidden Feature for iA Modes- Single Area AF selection

A couple of requests of how to use the moveable focus target in the iA mode so I thought I'd run through it again for those who want to try out this feature.

If you are in the iA/iA+ mode then the way to access this hidden feature is:

1. Press the back control wheel in twice (until it shows exposure scale SS/F)
2. Turn the back wheel 1 click forward and then back
3. Half depress the shutter button

Now the left navigation button controls the cursor position. You can change its position on screen (but not its size).

I've done a quick YouTube video of how to do this here:
https://www.youtube.com/watch?v=1SQQBpJ-nrA

FZ300/330 Hidden Feature for iA Modes- Single Area AF selection

If you are in the iA/iA+ mode then the way to access this hidden feature is:

1. Press the Fn2 (it then shows exposure scale SS/F)
2. Half depress the shutter button
3. Use the left hand cursor button to select the AF point

Now the left navigation button controls the cursor position. You can change its position on screen (but not its size).

FZ1000, FZ10002, FZ2000/FZ2500 Hidden Feature for iA Modes- Single Area AF selection

If you are in the iA/iA+ mode then the way to access this hidden feature is:

1. With the Touch screen, fly out the expanded panel
2. Touch the icon with portrait/mountain view – SS/F panel appears
3. Half depress the shutter button and use the left cursor button to select the AF point.

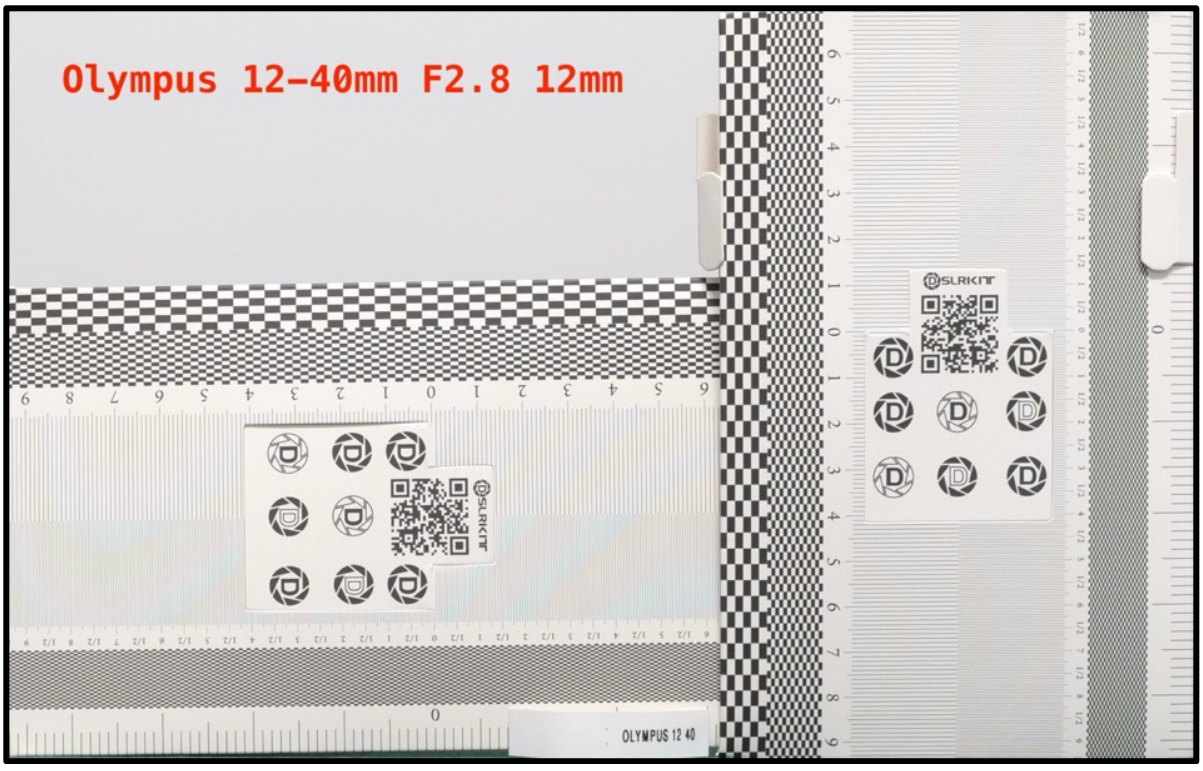
Now the left navigation button controls the cursor position. You can change its position on screen (but not its size).

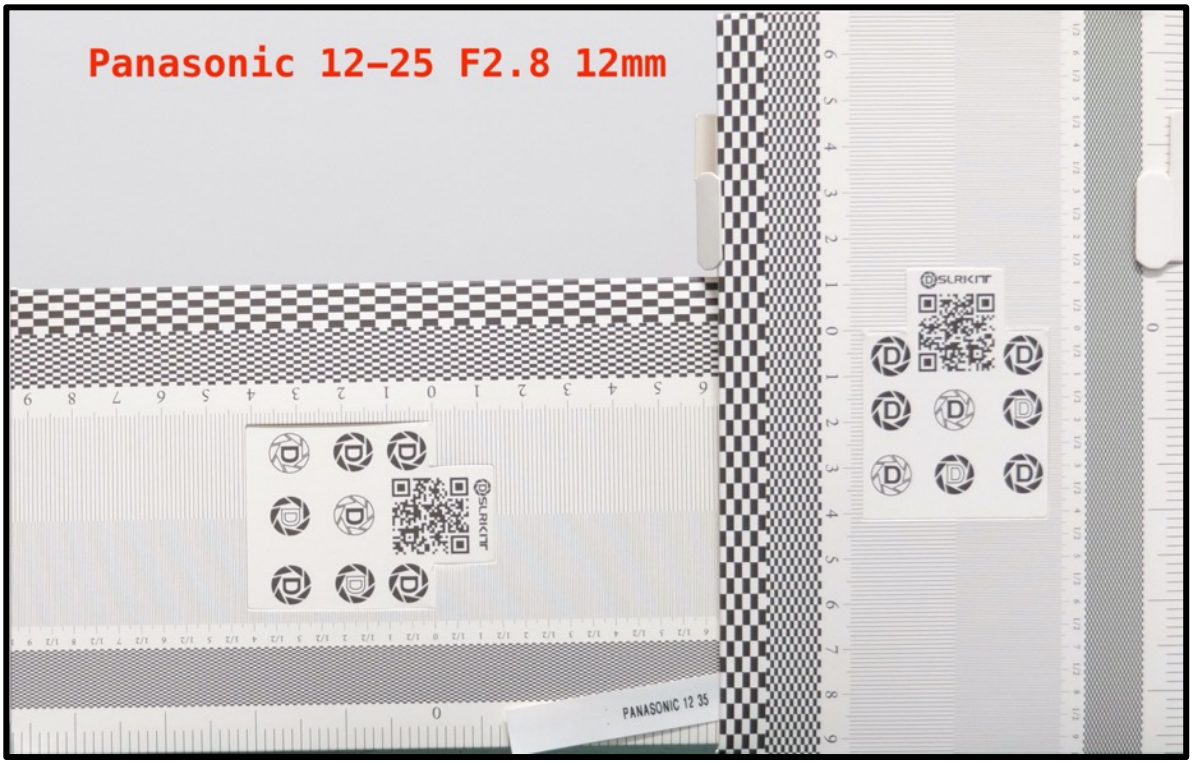
Single Area AF is a useful mode as it allows you to select a specific point in your subject that you want the camera to focus upon.
The modes remain active until you change mode or power off the camera.

Olympus 12-40mm F2.8 versus Panasonic 12-35mm F2.8 Comparison

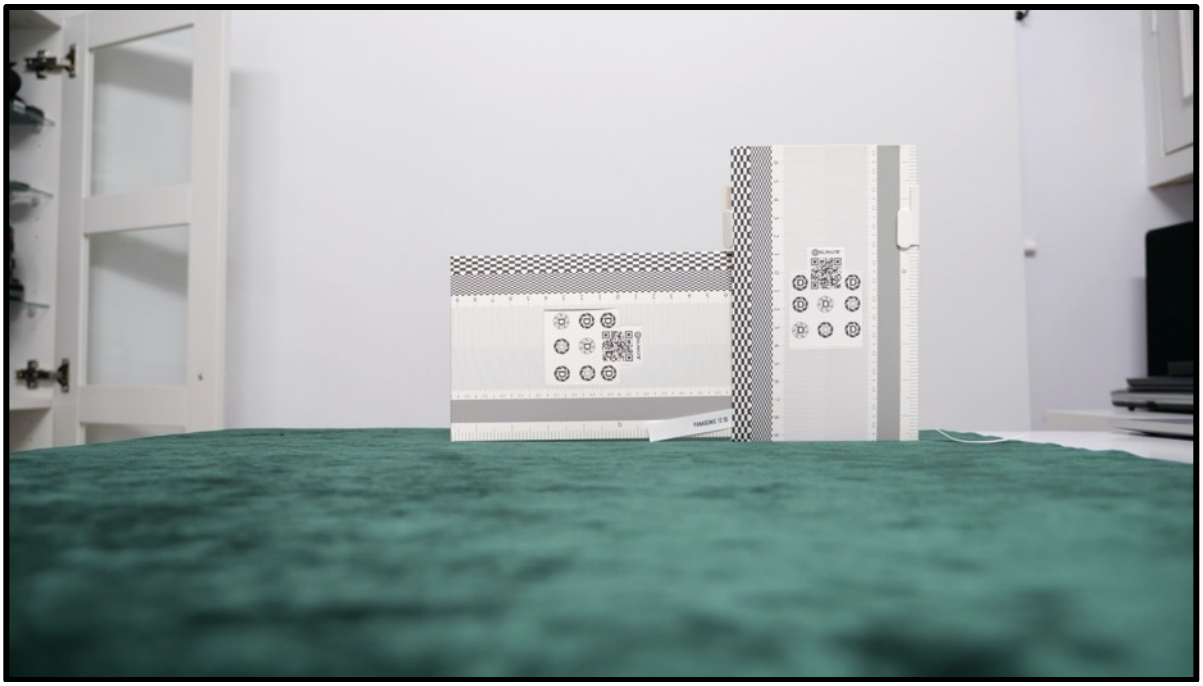
How do these two lenses compare when used on a micro four thirds camera with a high pixel count like the Panasonic Lumix G9
Well, cost wise in the UK the two lenses are;

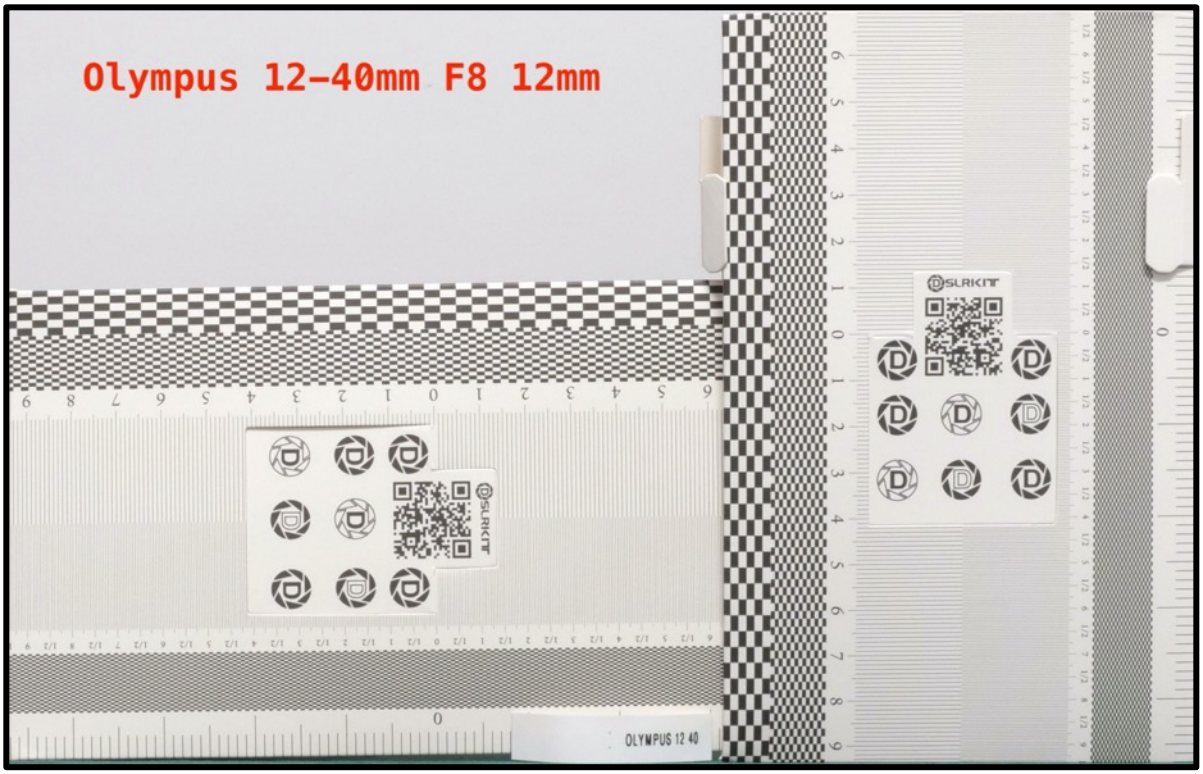
Panasonic 12-35mm F2.8 (Panasonic H-HS12035E) £770 (has now been updated)
Olympus 12-40mm F2.8 £675

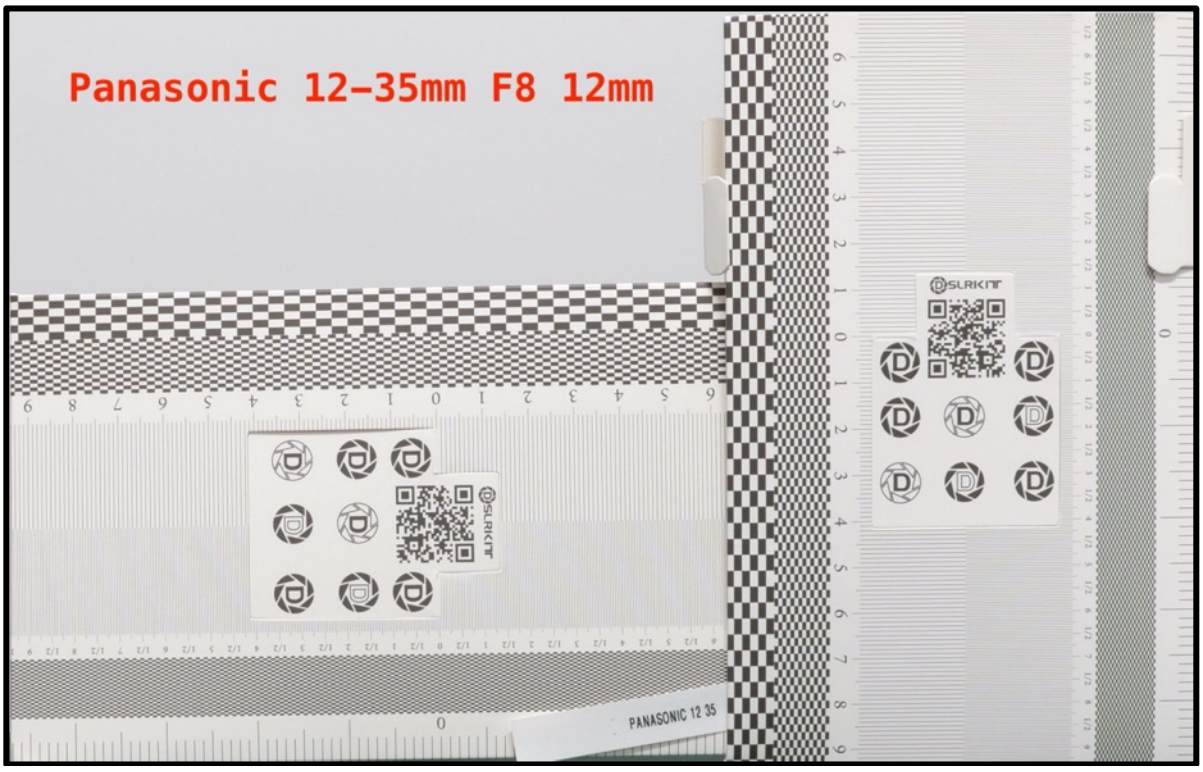




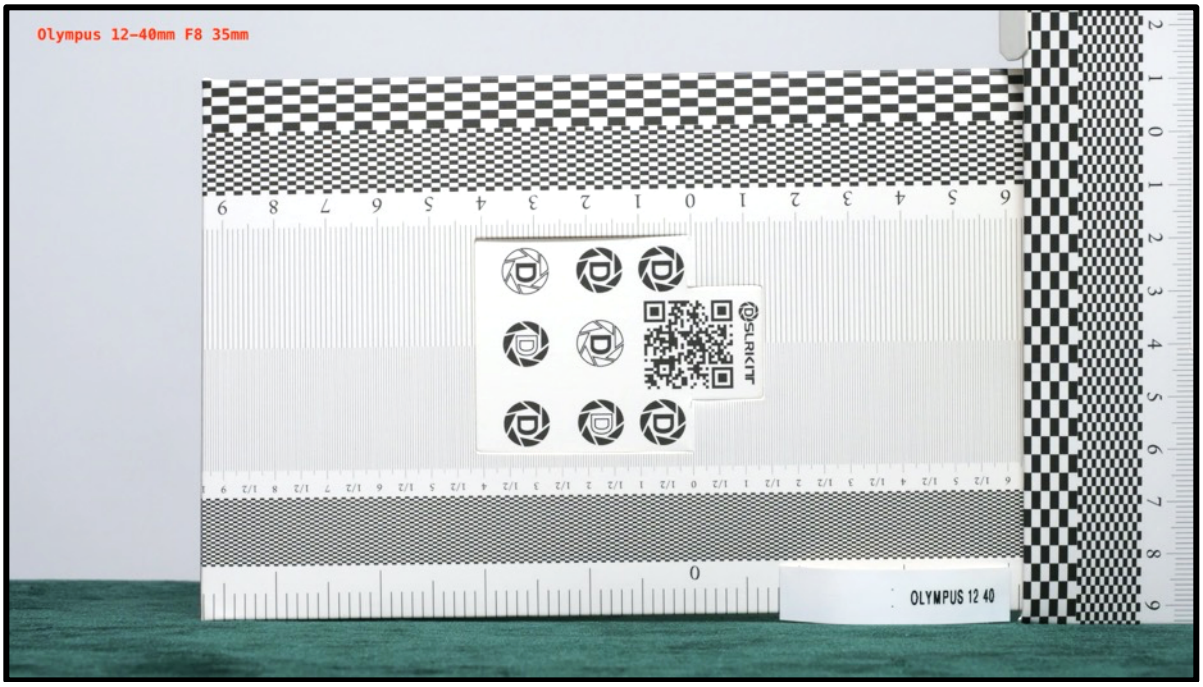
At the widest angle setting and F2.8 aperture the Olympus lens has better contrast which adds to the impression of a sharper image. These are the enlarged sections from the full target.

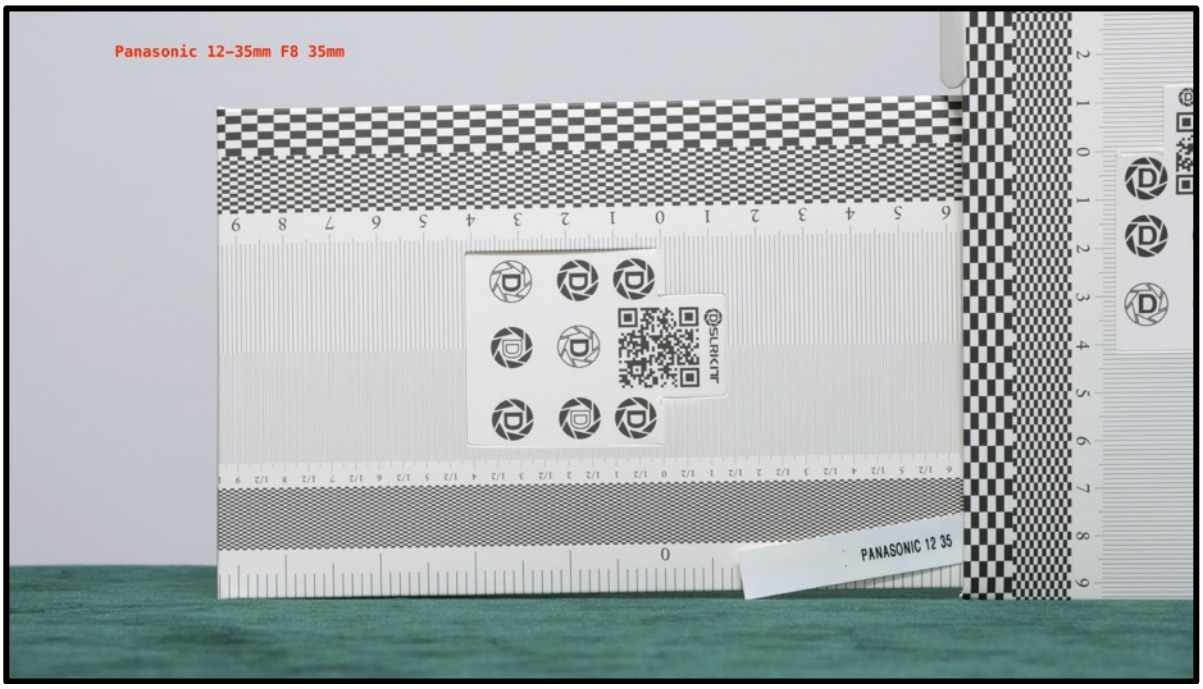






Closing down the aperture to F8 and both lenses perform almost identically.





With the Olympus lens set at the 35mm engraved position there appears to be less field of view than the Panasonic lens at the same setting. Again the Olympus lens just beats the Panasonic lens on image contrast.

Olympus Review

The Olympus 12-40mm F2.8 the lens features a dust-proof, freeze-proof, and splash-proof construction that is tailored to its use in inclement conditions.

The 62mm front element sits very close to the front of the lens element, though Olympus supplies a reversible LH-86 petal-type hood that you can use to give some protection.
As you zoom, the lens extends in length by a considerable amount (to over 125mm or 5 inches).

High-speed imager AF linear motor drive system, with MSC (Movie and Still Image Compatible) support, provides fast, smooth, and quiet focusing performance.
The manual focus clutch permits efficient and intuitive switching between auto and manual focusing control.

The lens construction integrates one aspherical ED (extra-low dispersion) element, two aspherical elements, one DSA (Dual Super Aspherical) element, two extra-low dispersion elements, one HD element, and two HR (high-refractive index) elements into its design to minimise aberrations, distortion, and colour fringing throughout the zoom range while also contributing to overall image sharpness, clarity, and colour fidelity.

Seven-blade circular diaphragm works to produce an aesthetic out-of-focus quality that is well-suited to shallow depth of field imagery.

Whilst the Olympus lens doesn't feature any optical stabilisation it really comes into its own on Olympus bodies or on the later Panasonic bodies featuring in body stabilisation (IBIS).

Panasonic Review
The Panasonic 12-35mm lens design is reasonably complex, with 14 elements in 9 groups. Much of the optical complexity comes from different types of glass: four aspherical elements, two ultra-extra dispersion elements, and one UHR element.
In other words, half the glass in this lens is special glass. It also has Nano coating -a method of using Nano particles in lens coating to reduce flare and ghosting -and you've got a modern lens design.

Like most Panasonic lenses, this lens also has image stabilisation, in this case Power OIS, which is enabled/disabled by a switch on the side of the lens.

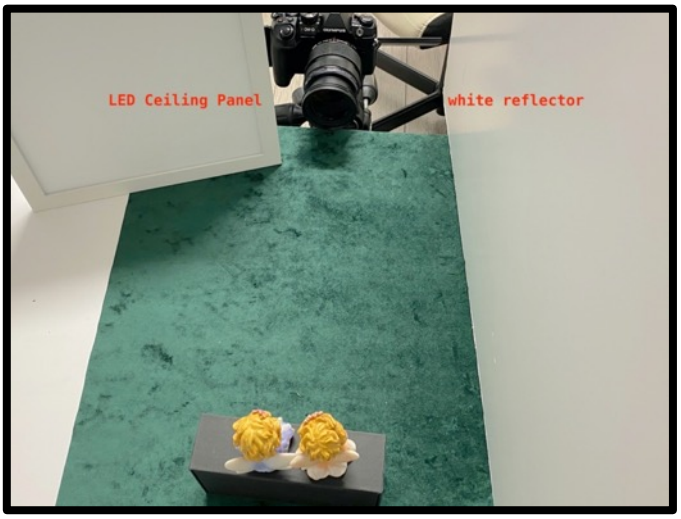
The lens has a 58mm filter thread and a Panasonic-supplied H-HS12035 lens hood (the lens also comes with a soft case). The hood is the typical petal shape you find with most wide angle lenses, and bayonets onto the front of the lens in either operating or reversed travel position.
Panasonic suggests that the lens is "dust and splash proof."
Given that the rear of the lens doesn't taper, there's quite a bit of overlap to the body mount. That, coupled with the lens' own sealing, means that you can probably get by shooting in light mist with the lens without worrying about electronics getting wet with negative consequences.

The lens is marked at 12mm, 14mm, 18mm, 25mm, and 35mm positions on the zoom ring, but there is no focus scale or DOF markings. Close focus is about 9" (.25m).

Desktop Practice

When the weather is bad outside I do like to experiment using different light sources. In this case a daylight rated 30cms square LED ceiling panel was used with a white reflector to capture the image shown below. Being close to the subject provided the nice soft light and the reflector just filled in the slight shadows on the faces of the little angels.

A couple of cute little angels from the £1 shop



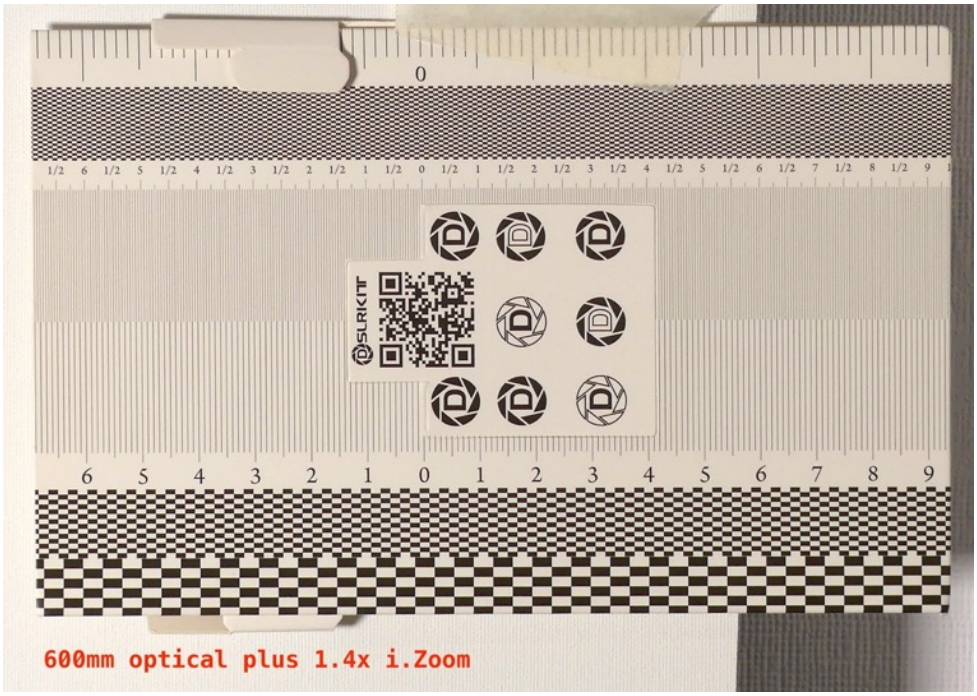
The desktop setup for the image above.
Light from a 30cms square LED ceiling panel and to fill the shadows a white reflector placed to the side to reflect back some of the light in the shadows cast.
The little models were 1 metre from a white background (rendered grey because of the light fall off)

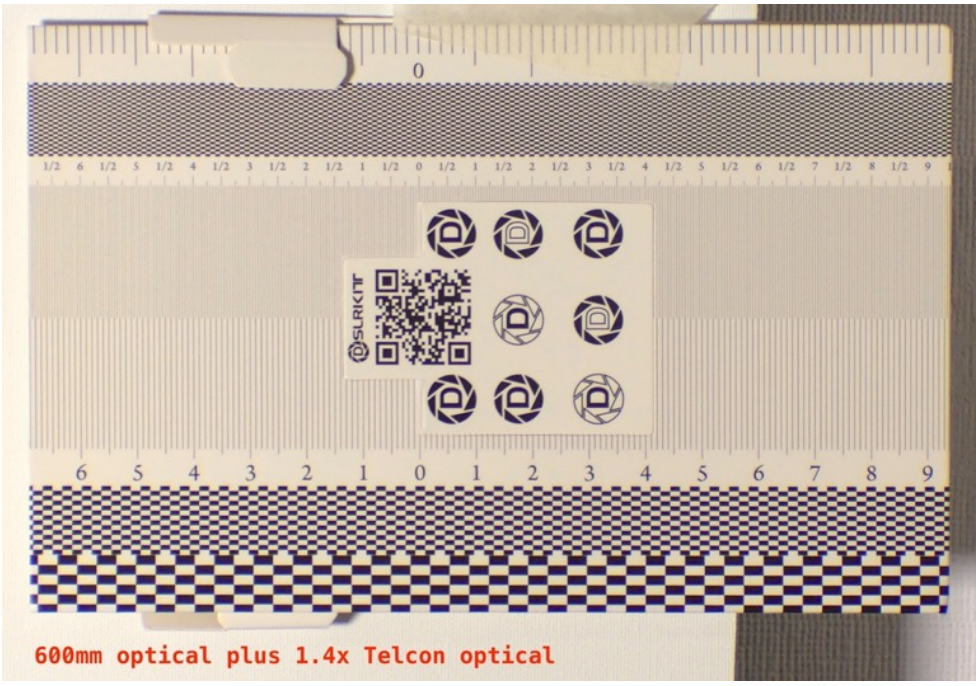
The second image is a small plastic tiger which I silhouetted against a circular light image projected from a small LED light plus gel filter and circular snoot. I tried to create a Savanah sunset.

This was more of a challenge as red saturates so easily blowing out all the details in the knitted doll.

Teleconvertors on the FZ200/300/330 versus i.Zoom

Does adding a optical teleconvertor give better results than using i.Zoom on the Panasonic FZ200/300/330 bridge cameras?



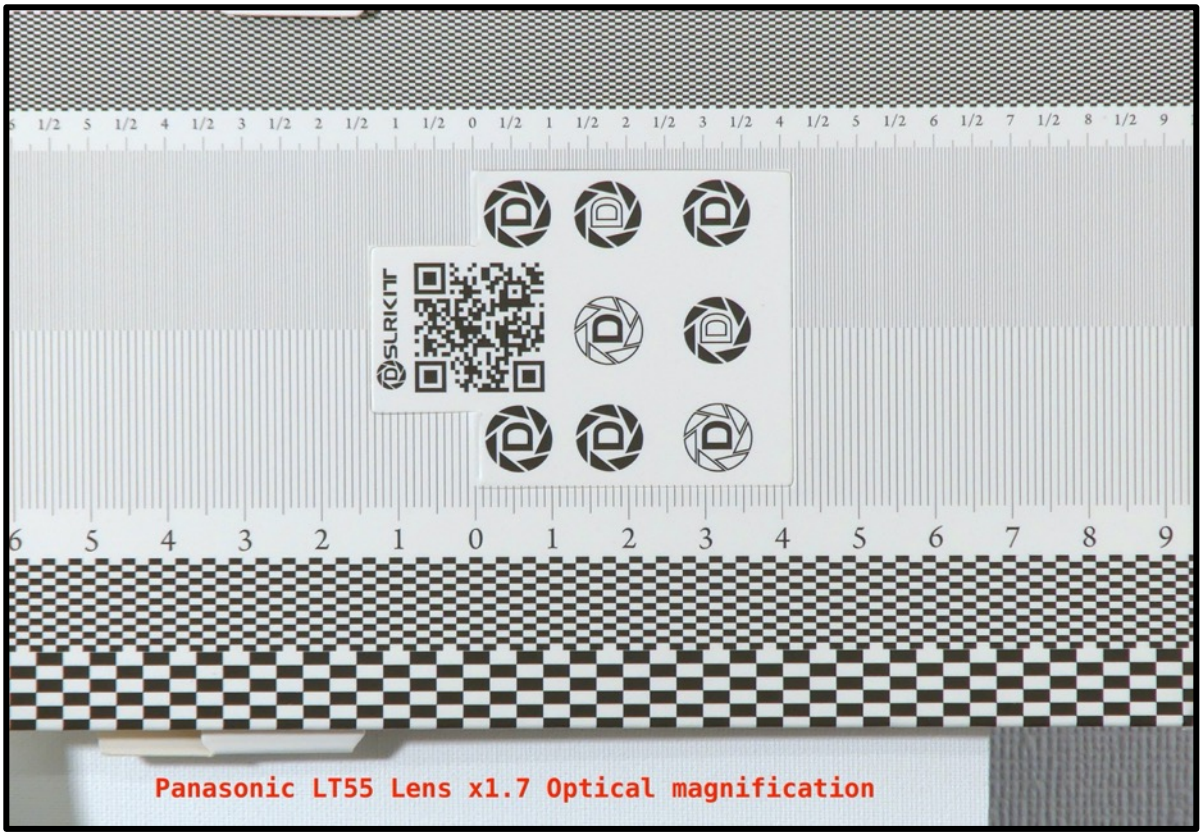


As you can see in these tests using equivalent i.Zoom gave better results than using the 1.4x Olympus TCON lens.

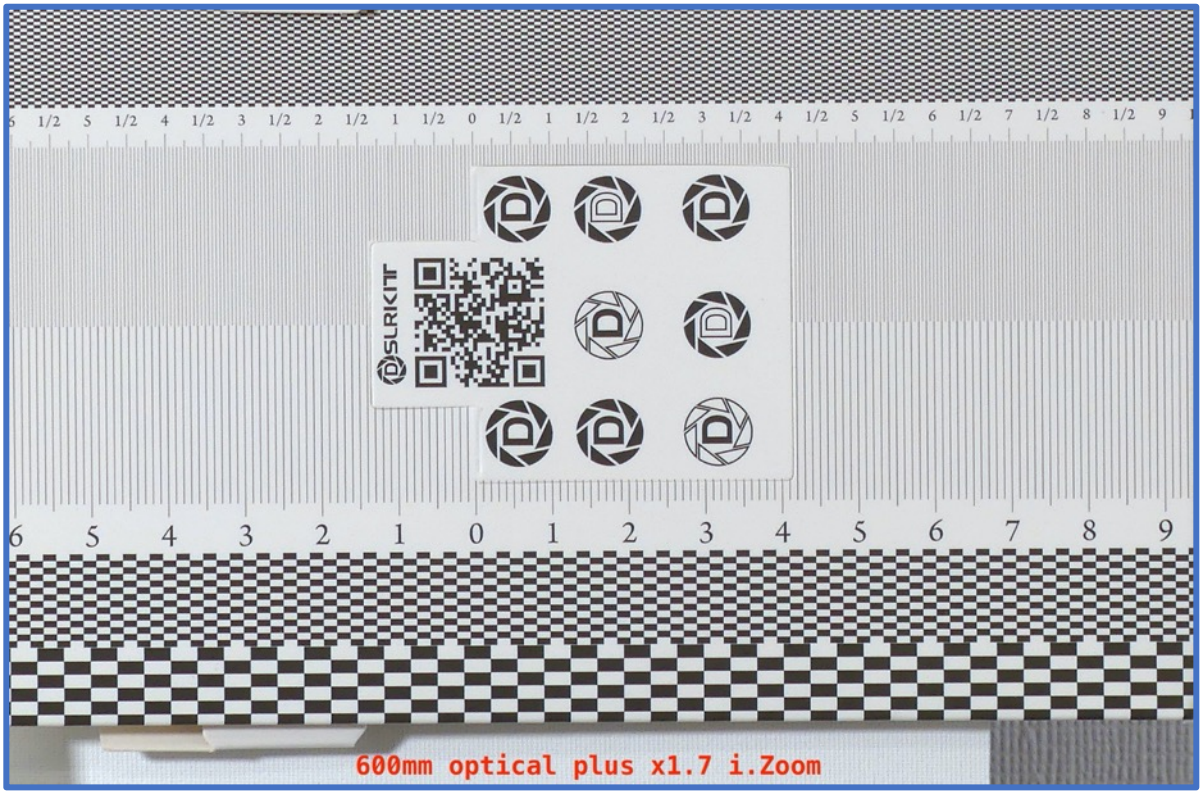
I ran tests on the Panasonic LT55 lens some years back and I remember getting similar results. I decided to re-run the same tests by purchasing another LT55 lens from Amazon and got the following results at 1.7x i.Zoom versus the 1.7x Optical teleconversion.

The original tests on the phototalk pages of my blog
https://www.grahamhoughton.com/photo-talk/

The repeated tests with the LT55 lens and 600mm optical plus x1.7 i.zoom



With the lens aperture set to F5.6 there is a noticeable fall off in resolution centre to edge. Target is placed 5 metres away from the camera lens. Electronic shutter used to reduce camera vibration.



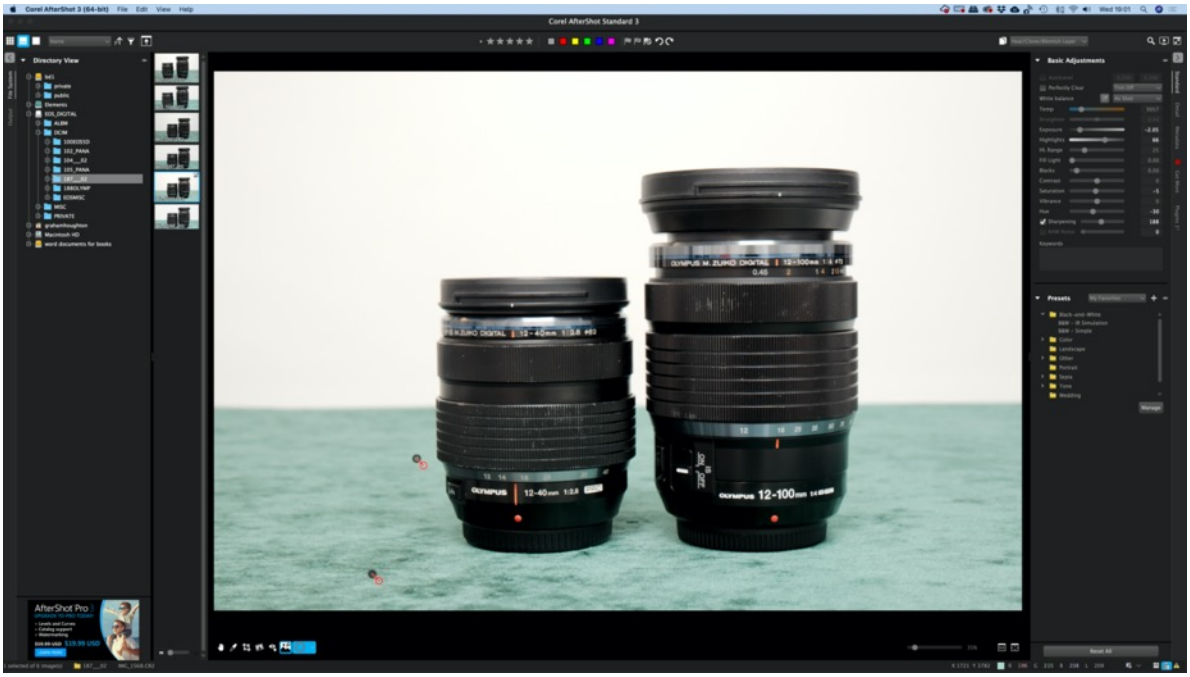
Here again the i.zoom image provides a better image than the optical extension with the LT55 lens attached. There is more contrast with this image compared to optical only enlargement.

So given the price of the LT55 lens (£139) plus the need for the lens support tube one has to question the need for the optical extension. With the T conversion setting applied the focus range is 5.5metres to infinity where the i.Zoom can be used from 1 metre with AF macro mode selected. To keep the lens and camera balance you also need a lens mounting ring which fits the adaptor tube. Depending upon the model of tube you may find one of the Canon rings will fit the tube and allow you to get the balance correct on a tripod.

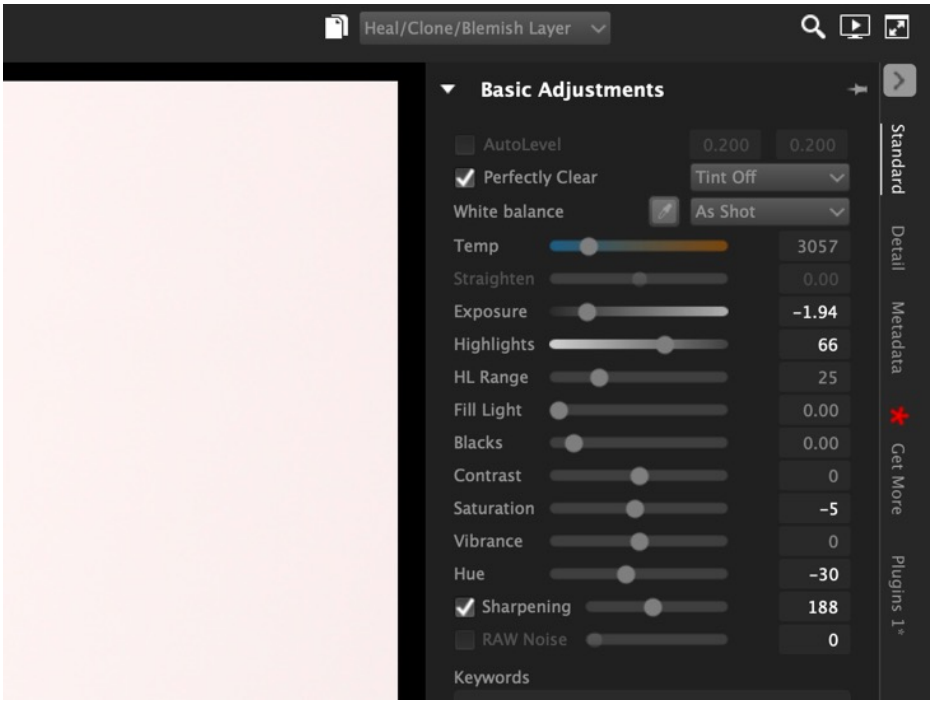
Free Corel Aftershot 3 Raw Processing Software

After a number of positive feedback comments about the free Luminar3 software link that I posted this month I've found Corel Aftershot 3.0.
It is free to download for either MAC (OSX 10.9) or PC (windows 7 or later) and can be upgraded to the PRO version for just $19.99. Just enter **aftershotro.com/ppmag** in your browser window to get the program link.
Just enter your email address to receive the file and activation code.
When activating the program at launch, put your email address as the user and then the supplied activation code to unlock the program.

There is an option within the program to download a number of Canon, Olympus and Panasonic RAW profiles which give you better starting points than the sup[plied defaults of the program.



The Corel Aftershot 3 User Interface



The basic adjustment panel

Until next month thanks for your subscription. Graham