**Sensor Marks**

We’ve all done it. Gone off to some lovely place and taken what we think are cracking shots blessed by blue skies, chirping birds and amazing scenery. On the review screen they look amazing. When we get them home on our pc screens they still look pretty good. Start to zoom in and our brows become furrowed. The smile fades from our face and we start to look perplexed. What are those marks in the sky? By now we’ve zoomed in as far as we can and the sky (you can insert the sea, snowscape, cloudscape or just about anything nice and light as dust spots like these kind of places) looks like the surface of the moon with spots, specks and odd shapes peppering what we thought was a pristine image. I’m sorry to give you bad news but you have dust spots on your sensor - I don’t use the phrase ‘dust bunnies’ as that implies a jolly, fairly cuddly experience that couldn’t be further from the truth. Welcome to life with a camera that has interchangeable lenses. Let’s look at an example below using an image I recently took using my backup camera of the memory stones at the top of Portland:



Memory Stones, Portland, Dorset

The eagle-eyed among you might just see the odd little mark or two in the darker blues towards the top of the image but here’s a close-up of one particular area:

  
Sensor marks Canon DSLR after six months of use

Bearing in mind this is only 25% of the sky in the overall image you can safely assume there’s as many spots in the rest of the sky which means I’ve got some decisions to make - but we’ll look at those decisions later. These marks are significantly different to marks on the front or rear elements of the lens which normally look smeary rather than this concise. Sensor marks also tend to appear in the same place in all of your images at more or less uniform sizes. High Dynamic Range (HDR) is notorious for highlighting both noise and dust spots as the method uses an overlapping of several images. Let’s see what those marks are, how they got there and what we can do about it:

**Prevention is better than cure**

1. **I barely take my lens off**

Every time you take a lens or extender off the main body of your camera you leave it wide open for dust, pollen, sand, insects and lots of other airborne detritus to enter. It matters not that you ‘only had the lens off for a second’ as the very act of taking the lens off has probably released some particles into the camera body. Most modern sensors have an anti-static coating but there will always be a weak residual charge present that sooner or later is going to play a part in attracting that lonely piece of dust just floating around your camera body. If you bought your camera brand new and immediately put on the only lens you were ever going to use and never took it off then you’d probably avoid seeing a sky like the one in my image, but life isn’t like that as a photographer...

1. **I can see the dust marks through my viewfinder**

I doubt it, I really do. Instead what you are likely seeing is dust and dirt particles on your mirror or the prism screen inside your camera, or maybe even in the viewfinder if you have one. Whilst irritating they rarely cause any issue with the overall quality of your images but like sensor marks you can limit their arrival and even clean them off.

1. **I have no choice but to change my lens on location**

Welcome to my world. I’m often in a position where the subject moves further away (it’s rarely closer - life isn’t that good) or I need to take another angle on a landscape which requires me to either change the lens or reach for my second body as I’m in the fortunate position of having a backup camera. For arguments sake I have to change lenses and I’m on location where there’s no convenient building and my car isn’t an option - two places I’d certainly head for if it was possible. If it’s dry and relatively calm I would have the lens end cap off and the lens I need attached close by. Next shield the camera body against whatever wind there is and point the lens towards the ground so the camera body, when open, is less likely to have anything blown in. Get used to how your lens releases and attaches to the body. The more confident you are about this the quicker you’ll be at changing lenses over.   
  
I always turn the camera off before swopping out lenses as it keeps the circuitry happier and minimises the potential for a static charge from the sensor attracting even more dust. It’s then just a matter of releasing the attached lens (already with the lens front cap on so you don’t scratch it putting it down) and replacing it with the other lens.

Once the camera body and lens are sealed, I make sure the replaced lens has its end cap on and is stowed away carefully unless this is one of those moments when you really have to get the shot and there’s no time for such niceties. Total time between one lens off and another on should be around ten seconds tops and yet look at the state of my sensor in just six months - much of that time there’s been a 1.4 extender permanently sat there too.

Of course, changing a lens in these optimal conditions is the ideal but again life is rarely that easy. Factor in a driving wind, rain, sand (beach locations are a nightmare) and poor light and you are suddenly in a world of dust sensor pain. Most of the time, irrespective of the conditions, the suggestions I’ve made above apply equally to more severe weather and less friendly locations. If it’s tipping it down, I really would try and find somewhere dry to change lenses - I have done it under my coat before now but you have to keep the body and new lens free of rain (no really).

There are a few more tips and tricks available to you if you want to limit the chances of dust and dirt entering your camera body:

Best practice would be to check your sensor on a regular basis to make sure there’s no build-up of marks over time. That requires a degree of technical know-how and some equipment which I’ll finish this note with.

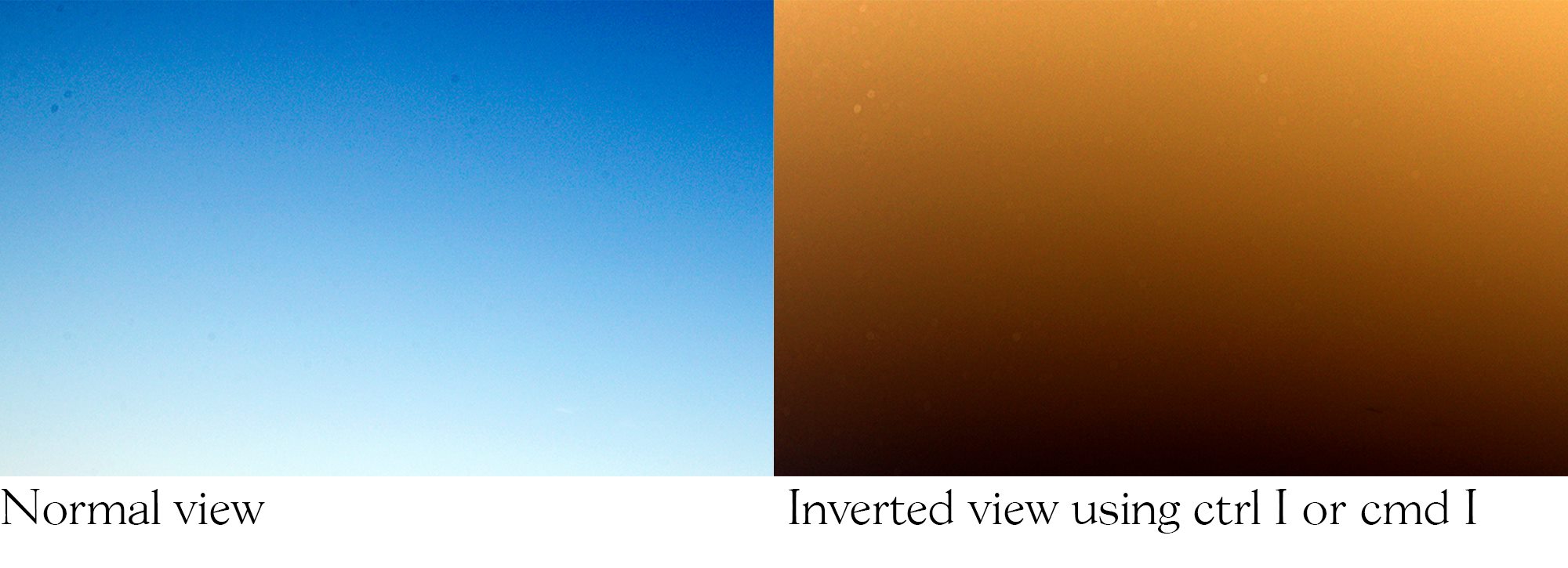
Ensure the area between your camera body and where the lens attaches is clean and free from dust before you change lenses. If you have a blower or microfibre cloth then a quick go with either will reduce the potential for dirt dropping into the camera body. Even better would be to clean all your kit the night before including any lenses you might use the following day.

If the worse comes to the worst, and despite you knowing you have a sensor that’s looking a bit grim but you have to use your camera, then try to shoot at lower apertures i.e. f5 or thereabouts as dust on the sensor is more obvious when you shoot at a higher aperture - f11 upwards - as the depth of field is greater.

**A better way to check for sensor marks than finding out after a shoot**

Let’s face it. Coming back from a shoot - whether it’s a paid gig or some time out with the family - and finding sensor dust Armageddon is not the best end to your day. You can of course spend the next week cloning out those pesky marks in Photoshop but I’d much rather know about them before I even set off. Here’s what I usually do:

Set your camera to aperture priority or preferably manual and crank up the f stop to its highest number - usually f22 or larger. Use a lens big enough to cover a square of white A4 paper even if it means getting close to it. Fill the frame with the paper, defocus the lens and take it off AF. Lower the ISO to as low as it will go to give you a high aperture number and take a couple of shots of the paper. Check your review screen as cameras have a horrible habit of reducing pure whites to an 18% grey.   
  
  
If the paper appears grey then lower the shutter speed or drop the aperture a tad until you get a white image. Now load the image onto your computer. If you have Photoshop or Lightroom then use it and zoom in until you can see if you have any dust marks or not. A top tip is to hit Ctrl + I on Windows (Command + I on a Mac). This will invert the image colours and enable you to see any marks more clearly. I’ve used my original image as my example but white paper is even more effective:



Normal view v inverted view of Canon DSLR sensor marks

**Decisions, decisions**

Despite all we’ve done to limit dust landing on our sensors it’s become apparent we have a wee family of them living on the most important bit of our camera. What to do?

Many modern cameras have a sensor cleaning mechanism which allows the camera to self-clean using high frequency vibrations. The first thing to do is ensure you’ve enabled this feature in your menu. It will go some way to reducing those marks.

If you have software like Adobe Lightroom, Elements or Photoshop there are a number of ways to remove dust marks in post-production. Better still you can remove dust spots in Camera Raw at the very start of your workflow. I’ve added a link to a good article below, but you’ll need Adobe CC to use it, however on the right of the screen are a number of other video tutorials for LR and other software including how to use the clone tool and spot healing brush:

https://www.youtube.com/watch?v=Uin2aUUtxaE

Great Paul. I can now shut myself in a darkened room and not see my family for days as I remove all the dust marks in my images I never even knew were there until I read your article. How about letting me know how to clean the sensor?

I’m glad you asked. There are two strands to the answer to your question:

1. Find an awesome sensor cleaning company that’s reputable, trustworthy, committed and highly rated by its customers. Then start saving your hard-earned money to pay for the aforesaid sensor cleaning as it’s not cheap - but then your sensor isn’t cheap to replace if you damage it trying to clean it yourself so caveat emptor. **I personally take zero responsibility for which path you decide to take.**

All I’d say is if you don’t feel confident in your abilities to clean a sensor after looking at the video tutorial below several times then send your camera away. I personally clean my own sensors but that’s not to say I’ve not had the odd ‘omg’ moment when I can’t get an especially sticky piece of dust off the sensor.   
  
2. Take a look at the video tutorial below and see what you think. The least invasive thing you can do after using the in-camera sensor cleaning mechanism is to buy a good rocket blower and blast some air around. You may well dislodge any dust on your sensor or you could end up moving the dust around and getting more on there. I’ve just used one to clean my sensor and it removed around 60% of the dust I could see using a lighted sensor loupe (invaluable piece of kit that allows you to light up the inside of your camera and magnify the view - I use an Opteka 10x LED sensor loupe):

http://f64academy.com/clean-camera-sensor/   
  
Please **DO NOT** use compressed air to deal with dust. The stuff often becomes very cold and can be very powerful - both are equally unkind to sensors.   
  
So, there you have it. My take on dust marks and the perils of owning a camera that has interchangeable lenses. I hope my note has helped a little bit. Feel free to get back in touch with me on the page or via paul@paulwilliams.photography.   
  
I’ll leave you with a blemish free image of the Memory Stones over on Portland:

