

A Different Perspective



Working with lens distortions and convergent lines.

By Nick Melidonis, M. Photog.

In the years BD (Before Digital), photographers using film didn't have a lot of options when having to deal with converging verticals (the convergent lines or keystone) we are all familiar with when pointing our cameras up at tall buildings or structures) or distortions created when taking images with very wide-angle lenses (volume anamorphosis).

Converging verticals could be removed by having the plane of the camera lens parallel with the plane of the building we were shooting. If that were not possible, SLR users used perspective correction or tilt/shift lenses or adjusted the lens plane by using the bellows in larger format cameras. The latter corrections are still used by many architectural photographers today.

Anamorphosis with film cameras was very hard to eliminate, especially when the photographer had to get close to the subject with a wide-angle lens due to lack of space. Fortunately, the solution has become much easier with the use of digital software and this article will cover lens corrections in Lightroom, Photoshop and DxO Optics' Viewpoint software.

Adobe Camera Raw (ACR) is found both in Lightroom and Photoshop and is similar in its use in both Adobe products. I personally like the interface in Lightroom somewhat better and find it easier to use than Photoshop, but there is little difference in either. ACR contains some pretty powerful lens correction tools to handle distortions.

Lightroom

Since Lightroom doesn't work on pixels (changes made to the thumbnails in the library remain in its catalogue, not on the original file), Lightroom lens distortion changes are made in the develop module in the 'Lens Correction' tab. Once corrected, the image needs to be Exported to produce an image file. These changes use the ACR interface and are similar in both Photoshop and Lightroom. Most software fixing distortion changes use metadata in the image files to determine what camera and lens combination you used. You have the choice of using an automatic profile correction which is applied when clicking the 'Auto Profile Correction' square on the top left of the 'Lens Correction' tab, or manage the

corrections manually. Manual correction is an option in the Lens Correction Tab.

'Auto Profile Correction' is very good at removing many lens aberrations and especially good at correcting barrelling (curved surfaces or horizons) which can occur with the best of lenses. It's also very good at removing the intense curvature caused by fish-eye lenses. However, it's not that good at removing keystone or converging verticals.

Distortion Slider

Let us have a look at some of the corrections we can apply within the Manual options in the 'Lens Correction' Tab.

The 'Distortion' slider can be used to remove barrelling or curved horizons if Lightroom's auto function doesn't work to your satisfaction, or if it can't access the metadata to determine your camera/lens combination. If you have been scanning negatives, then you would need to manually adjust these sliders for your image due to the absence of metadata. Sometimes, the 'auto' function will take its best guess and then you may wish to fine-tune the result.

The Distortion Slider can also be used to correct Volume Anamorphosis. We have all experienced this when photographing people who are framed at the edges of an image taken with a very wide-angle lens, such as a 16mm or 14mm lens (full-frame equivalent). Faces or body parts appear stretched and distorted, horizontally or vertically, and often appear comical. Circular objects in landscapes also stretch and distort near the edges.

By moving the Distortion Slider, usually to the left (moving it to the right will produce a fisheye effect), you can correct distortions to taste. Results are not always perfect, but certainly, you will get a vast improvement.

Be aware that in all corrections; whether you are correcting keystone or anamorphosis; you will lose some 'real estate' around the image during the correction process. By understanding this, it is advisable to always leave plenty of room at the edges (or the top and bottom of images) when taking the photo to allow for the loss of image content. This, of course, is not always possible as often the very reason you used an extreme wide-angle lens was because you couldn't step back far enough to take the image in the first place.

On occasions, I find that perfect corrections to converging verticals or other distortions can appear false and a little

manual tweaking to put a 'tad' of distortion back into an image can appear more realistic.

Vertical Slider

Another slider is the 'Vertical' slider and that will correct vertical keystoneing. Pull the slider to the left and align the sides of the buildings or the objects with the grid lines. You will find that as you are making your adjustments, the image is also elongating and you will lose some of the vertical content in your image and a space will appear on the left and right of the image which would need to be cropped out later. By clicking the 'Constrain Crop' box, it will do this for you.

A lesson learnt here is that if you are going to take images of tall buildings with the intention of straightening them out with software later, allow plenty of space around the image knowing a fair portion will be lost in the process.

There may be some horizontal lines that you wish to straighten as well or even tweak a little once the vertical corrections have been made. Altering the Horizontal slider will achieve this. The image may also need a little rotating left or right to get the best fit within the grid lines and you use the Rotate slider to do this.

A little tip here for making smoother changes to the sliders is to click on the slider and then tap the up and down arrows on your keyboard for more precise control. If you wish to return a slider back to zero, just double click the slider. If it all goes pear-shaped and you want to start again, click the Reset button on the bottom right.

Fringing

When an image is magnified, you may see some coloured fringing around the edges. These can appear as green or purple lines. The 'Colour' option between the Profile and Manual options will allow you to correct this manually or Lightroom can do it in the Auto mode when it understands which lens you are using through the metadata.

Lightroom can also easily allow the straightening of horizons in an image. In the Develop module, click the Crop Overlay icon at the top left of the Develop options (looks like a broken square) and click on the Angle Tool. Now click on one part of a horizon or something you want straightened; hold the mouse and run the line to another point. When you release the mouse, your image will straighten along the path you've chosen.

Again, you may lose a reasonable amount of 'real estate' depending on the amount the image was skewed. This process can also work with a vertical correction, say along the sides of a building. Click the Crop Icon again and the image will now be cropped with a straight horizon or vertical object. If you wish to come back again to what you did, click the Crop Overlay icon again and it will revert to your previous state, allowing you to make new adjustments.

If you need real pixels from a Lightroom image to print, use the 'Export' option (bottom left in the 'Library' mode) and your changes will be exported as an image file so you can print or continue editing in another imaging software program.

Some examples of the processes outlined above will be shown in this article with images that need correcting.



The Royal Palace in Phnom Penh was taken with a Canon EOS 5D using a 24mm lens and pointing up at the collection of buildings. This resulted in keystoneing or converging verticals. Using the Lens Correction tools in Adobe Camera Raw (see article), the grid function was turned on (A, outlined in red) to assist with straightening the image. The Vertical Slider was moved to the left (B) to try and align the vertical pillars with the vertical grid lines.



Although the pillars are now straight on the left hand building, the pillars on the right hand building are not quite straight, but close. With the Lens Correction tools in Adobe Camera Raw, this will be as close as we can get to straightening the building.



For a more precise correction to the Royal Palace buildings, I used the 'Perspective Crop Tool' found in Photoshop. I outlined the whole image as though I were doing a normal crop, and then I grabbed each of the top handles and placed them so the left and right lines (marked in white) were parallel to the pillars both left and right in the image. When I pressed 'Enter', the building was now perfectly straight.

Photoshop

Photoshop also has ACR and although the adjustments are similar, it is of course carrying out the changes on real pixels in your image.



Correcting diverging verticals in DxO's 'Viewpoint' is a breeze. In this image of an Indonesian temple (Prambanan; Canon EOS 5D Mark III with a 16-35mm lens), I chose the 'Force Vertical Parallel' tool at the top right of the interface and then placed the circles very precisely by using the enlarged view in the 'Loupe View' at the bottom right. The red lines mark the angles I chose. I then ticked 'Apply' at the bottom.



The straightened image of the temple was saved as a TIFF file. Notice that the crop now appears a little tight on the left hand side of the image. I later used the 'Content Aware' tools in Photoshop to fill in the left side, thus providing a better composition.



The 'Rectangle' tool in DxO's 'Viewpoint' is ideal for making a perfect rectangle if the sides, top and bottom of an image require straightening. The 'Perspective Crop' Tool in Photoshop can produce a similar result. I purchased this historic photograph of Ernest Hemingway in Barcelona and made a quick capture of it without a copy stand. I placed the four circular handles of the Rectangle Tool at the four corners of the photo, clicked 'Apply' and 'Hey Presto', a perfectly rectangular photograph.



Barrelling is common in some lenses and the 24-105 mm L Series Canon Lens, sharp as it is, suffers from it. In this photograph from the island of Tinos in Greece, the top of the door had a pronounced curve due to barrelling. I chose the 'Lens Correction' Tab in the Develop Mode of Lightroom and just clicked the 'Enable Profile Corrections' box. The picture straightened perfectly (picks up the metadata to find what lens I was using) as can be seen here. With the massive curvatures in fisheye lenses, this tool is nothing short of amazing as it straightens the curves easily.

The preferences in Photoshop can be set so ACR adjustments can be used for commonly used files such as JPEGs, TIFFs, as well as raw files. Use Edit>Preferences>File Handling and tick 'Prefer Adobe Camera Raw for supported raw files'. Now select the dialogue box marked 'Camera Raw Preferences' and at the bottom of the new dialogue box, tick 'Auto open all supported JPEGs' and again for TIFFs, 'Auto open all supported TIFFs'.

When you open an image, it will now take you directly to the ACR interface first. Choose the icon sixth from the left at the top (looks like a lens diaphragm) which is the 'Lens Correction' tool and then the processes outlined in the Lightroom segment above are exactly the same for Photoshop. After all, the ACR engine is the same.

DxO Optics' Viewpoint

DxO has been around for many years and this quality French software company produces software to process raw files similar to Adobe and Capture One, as well as making excellent software to test and compare lenses.

It has produced its excellent lens correction and lens distortion software as a standalone program called 'Viewpoint' and at around US\$49, I think it's an excellent buy. Most of the corrections it offers can probably be done in Lightroom and Photoshop using the ACR engine, but like a lot of third party software producers such as Nik Software, it has found a niche and allows all the corrections and distortions to be handled in one intuitive interface and you can make several corrections one after the other to the image.

For more precise positioning of the correcting lines and handles during the process, it has a cool loupe view that magnifies the relevant part of the image that makes corrections very accurate. For a quick fix (and in most situations that I have tried the anamorphosis corrections, for example), the auto buttons appear spot on. The only tweaking needed was to put a little distortion back in to make it look real.

Like most good third party software these days, you can launch 'Viewpoint' directly from Lightroom or from the Filters

Right: Volume Anamorphosis occurs when a wide-angle lens (in this case a 16mm lens very close to the foot of the subject) stretches the image, exaggerating objects close to the lens and making objects further away appear smaller than normal. My poor friend here looked like he had a 'kangaroo' foot. A simple click in DxO's Viewpoint's Anamorphosis Diagonal Tool marked in red at the top right of the interface, and automatically, the correct perspective is returned. The Lens Correction tool in ACR in both Photoshop and Lightroom (Distortion slider) allows you to manually adjust anamorphosis as well.

drop down selections in Photoshop. The DxO website and YouTube have some very good training videos.

Lens corrections, lens aberrations, keystone and lens distortions can all be handled easily and quickly using the excellent tools in Adobe Camera Raw and third party software such as DxO Viewpoint. Experiment with them to produce realistic corrections when next shooting architecture and using wide-angle lenses in confined spaces – the results will be worth the effort.

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The circular stupas in the Borobudur Temple in Indonesia were stretched due to anamorphosis producing an elongated ellipse instead of what should be a circular stupa. The image was taken with a 7mm lens (14mm equivalent) using an Olympus micro four-thirds EM-5 converted to Infra-Red. A simple click in DxO's Viewpoint's Anamorphosis Diagonal Tool corrected it automatically.



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